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Some frontline organizations presume that frontline command (defined as the direct supervision of frontline workers by frontline commanders) is required for frontline work to be effective. However, little scholarly effort has been devoted to investigate frontline command.

This thesis therefore investigates the effectiveness of frontline command in the police organization responsible for major criminal investigation and the response organization of the fire service. Several research methods are used to get a better understanding of the degree to which frontline command can be studied.

Contrary to the expectations of frontline organizations and many frontline commanders, the findings suggest that in current practice frontline commanders contribute to the effectiveness of frontline work only to a limited extent. However, in theory there is still a need for frontline command. This thesis suggests that frontline command can be appropriately studied and therefore calls for more empirical research to uncover the effects of frontline command and the degree to which it can be improved in practice. Implications for practice are provided.

Jelle Groenendaal

Frontline Command

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# Frontline Command

**Reflections on practice  
and research**

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## **Frontline Command**

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# **Frontline command**

*Reflections on practice and research*

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aan de Radboud Universiteit Nijmegen

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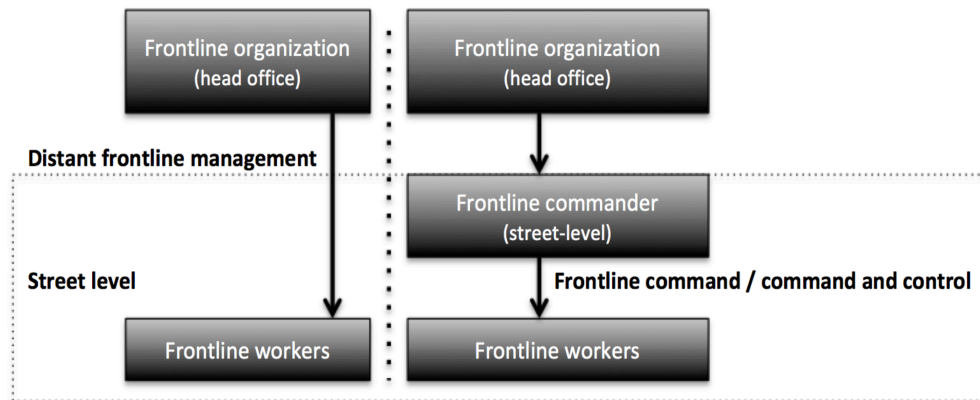
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## **Summary**

### **Introduction**

Considerable attention has been devoted in the public administration literature to the functioning of frontline organizations such as social welfare organizations, police and youth care. Frontline organizations share several defining characteristics. First, in frontline organizations there are frequent face-to-face interactions between frontline workers and clients. Second, primary tasks are often carried out outside the organization, i.e. distant from the head office. Third, primary tasks are carried out in an ever-changing environment and are difficult to plan in advance. The public administration literature has been primarily concerned with the degree to which frontline workers implement policy in practice and the way frontline organizations attempt to influence policy implementation at the frontline, also referred to as frontline management.

This thesis is about a barely explored topic in public administration research, specifically frontline command. In most frontline organizations, frontline workers solve problems in an environment relatively free of managerial supervision. These frontline organizations often attempt to influence the work at the frontline by applying 'distant' management tools, such as performance indicators and training. However, some frontline organizations assume that direct command of frontline workers is necessary for the effectiveness of frontline work and have appointed frontline commanders to meet this presumed need. The direct supervision of frontline workers by frontline commanders is referred to in this thesis as frontline command. Frontline command can be defined as making decisions in the frontline and ensuring that frontline workers carry out these decisions accordingly. Frontline command under high levels of time-pressure, such as in emergency situations, is also known as (incident) command and control.



**Figure a:** Two ways of frontline management

#### *Research aims and problem definition*

This thesis studies frontline command within the part of the police organization responsible for major criminal investigations and incident command and control within the incident response organization of the fire service. These organizations were selected because of their important frontline command operations and because we were able to get relatively easy access to them. The aim of this thesis is twofold. As very little is known scientifically about frontline command and incident command and control, the first aim of this thesis is to provide a preliminary view on the effectiveness of frontline commanders in two frontline organizations: the section of the police organization responsible for major criminal investigation and the incident response organization of the fire service. The second aim of this thesis is to contribute to future research by providing preliminary insight into the degree to which, and how, frontline command and incident command can best be studied, both in artificial and natural environments.

The central research question of this thesis is:

*How effective is frontline command in major criminal investigations and the response organization of the fire service?*



To answer the central research question, the following three sub-questions will be addressed:

1. What is frontline command?
2. How do frontline commanders perform, how can this performance be explained and what are the possible consequences?
3. What can be concluded from using various research methods about the degree to which frontline command and incident command and control can be studied?

These questions will be addressed by using several research methods to examine different aspects of frontline command in major criminal investigations, and command and control in the incident response organization of the fire service.

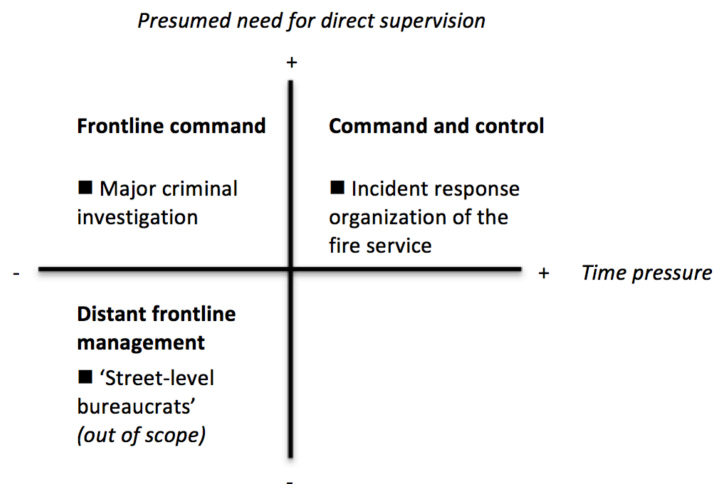
## **Literature**

### *Street-level bureaucracies*

Studies of frontline work in public administration have traditionally been shaped by researchers examining the functioning of organizations from the 'top down'. The top down approach stresses a rational, hierarchical notion of policy-making separation, which makes a sharp distinction between politics and administration. In this approach, frontline workers are regarded as being responsible simply for the delivery of policy, with any deviation from policy as set out by policy makers being seen as subversive. In response to this view on frontline work the bottom-up approach emerged. Lipsky is probably the best known representative of the bottom-up approach. Lipsky studied street-level bureaucrats in schools, police and welfare departments, lower courts and legal services to learn about how frontline workers balance the demands of policy implementation with the priorities of the communities they work within. He found that street-level bureaucrats contribute significantly to policy making through exercising discretion in their everyday work. Lipsky concluded that street-level bureaucrats are critical to the success of public organizations as they mark the final step in the policy implementation process.

The question of how to address divergence and to better align street-level actions with policy intentions had motivated many studies. However, these studies are primarily concerned with distant frontline management, i.e. managing street-level work from the office. Two other types of frontline management have received little scholar-

ly attention, namely the direct supervision of frontline work by frontline commanders under average levels of time pressure (frontline command) and high levels of time pressure (incident command and control).



**Figure b:** A typology of frontline work and frontline management

#### *Distant frontline management*

Different tools aimed at influencing street-level behavior from a distance have been examined, such as New Public Management strategies of performance-based frontline management, training, engaging workers in decisions about processes, providing feedback and the use of administrative interventions. These studies are based on various research methods: primarily interviews, participant observation, surveys, and collecting secondary data. In the public administration literature, there is evidence that (distant) frontline management matters to frontline work, but only to a limited degree.

#### *Frontline command*

Very little scientific attention has been devoted to frontline command. Several Dutch studies examined frontline command ('frontlijnsturing'), but these studies have used this concept in a different way. Hartman & Tops for instance regarded frontline command as a way of investigating the implementation of policy from the bottom-up instead of from the top-down. Their findings have little to do with frontline commanders. Consequently, their research findings do not fit here. One aspect of front-

line command has been studied extensively, specifically criminal investigation decision making. These studies are based primarily on simulations and serious games in which participants had to examine forensic evidence, some of which had been manipulated by the researchers. Though not all studies show comparable findings, most of them suggest that forensic decision making is sensitive to biases and contextual variables. The implementation of decisions in major criminal investigations has thus far received little scholarly attention.

#### *Command and control*

The scientific literature on incident command and control can be divided into three categories. The most extensive category is decision making under high levels of time-pressure, called Naturalistic Decision Making (NDM). NDM comprises of several decision making models, of which Recognition primed decision making (RPD) developed by Gary Klein is the best known. RPD explains how experienced decision makers are able to make effective decisions under time-pressure and uncertainty. Based on interviews with New York firefighters (both workers and commanders) about incidents, Klein found that in most cases respondents were not comparing any options (as was commonly suggested in rational theories of choice). They were typically carrying out the first course of action that came to mind. It seems that experienced decision makers were able to use their experience to 'recognize' situations as prototypical cases where certain types of actions are appropriate and usually successful. Only when time permits, will experienced decision-makers intentionally activate a so-called mental simulation process in which they imagine the course of action, to see if it will work, and to look for unintended consequences that might be unacceptable. RPD strategies of decision making have been identified in many other environments. The principal finding of all these studies is that frontline workers and commanders in the majority of cases make satisfactory decisions (though not always optimal!) on the basis of their experience, an ability also known as intuition.

The second and third category are concerned with respectively descriptive studies on incident command and control and normative studies on the performance of incident commanders. Different research methods have been used, from interviews to participatory investigations and analysis of helmet-mounted cameras. These studies suggest that incident commanders provide few orders and are able to control the incident response only to a limited extent.



## Analytical framework

### *Toward a model of frontline command*

When considering the literature on frontline management in general and particularly frontline command, it seems that the scholarly knowledge on frontline command is still limited and fragmented across different scientific disciplines. A body of research whose implications are not yet applied to frontline command is NDM. Insights derived from NDM research have, therefore, been brought together in a model of frontline command. This model is called FADCM and sets out frontline command in five steps, already described in the military science literature. The five steps are: factfinding, analysis, decision making, communication and monitoring. These five steps are the aspects that will be empirically investigated in this thesis to get a better understanding of frontline command.



**Figure c:** The five steps of the FADCM model

### *Assessing the appropriateness of research methods*

In the current literature, different research methods have been used to study frontline management: interviews, serious games, surveys, observation, participatory observation and observation aided by helmet-mounted cameras. According to the literature, these methods have their own strengths and limitations, but it is unknown how these strengths and limitations manifest themselves in the investigation of frontline command and incident command and control. To assess the appropriateness of research methods, a methodological assessment of the research findings will be provided. An analytical framework was developed to assess the research findings. The analytical framework includes the following criteria: external reliability (the degree to which a study can be replicated), internal reliability (the degree to which researchers

in the study agree on what they see and hear), measurement validity (the extent to which, in quantitative research, a survey measures the concept it was designed to measure), internal validity (the validity of a conclusion comprising a causal relationship between two or more variables), external validity (the extent to which the results of a study can be generalized beyond the specific research population) and ecological validity (the extent to which the specific research findings are applicable to people's everyday, natural social settings). In addition, the results of different methods will be compared (triangulation) to examine whether they converge, complement or diverge. Finally, the opinions of participants are incorporated in the analytical framework since the engagement of participants in the study may affect the way they participate.

### The studies

In this thesis, different research methods are used to study one or more aspects of the FADCM model in the section of the police organization responsible for major criminal investigations and the incident response organization of the fire service. To gain insight into frontline command and incident command and control in general, and the extent to which it can be studied, five studies were conducted. Two studies are concerned with frontline command in major criminal investigations. Three studies are about incident command and control in the fire service. In each study, one or more steps of the FADCM model are investigated (see table a).

**Table a:** The FADCM aspects under investigation

The studies	Factfinding	Analysis	Decision making	Communication	Monitoring
<b>C3: Forensic decision making by coordinators</b>	X	X			
<b>C4: Decision making among Command Core Teams</b>	X	X	X		
<b>C5: Ethical leadership of battalion chiefs</b>				X	
<b>C6: Incident command and control in exercises</b>			X	X	X
<b>C7: Incident command and control in real practice</b>			X	X	X

**Table b:** Research methods used in the studies

The studies	Interviews	Serious game	Survey	Observation	Participant observation	Helmet-mounted cameras
<b>C3: Forensic decision making by coordinators</b>	X	X				
<b>C4: Decision making among Command Core Teams</b>	X	X				
<b>C5: Ethical leadership of battalion chiefs</b>	X		X			
<b>C6: Incident command and control in exercises</b>	X			X		X
<b>C7: Incident command and control in real practice</b>	X				X	X

In each study, several research methods were used to investigate one or more aspects of the FADCM model. These research methods are shown in the table b.

#### *Chapter 3: Forensic decision making by coordinators*

The aim of this experimental study was to examine whether forensic decision making was susceptible to contextual information and emotions. The study included a serious game developed on the basis of a literature review and interviews. NDM mechanisms were applied in the serious game to examine whether participants were sensitive to contextual information or emotions in the decision-making process. The participants were divided into two groups (A and B) and had to distribute the available research capacity (in percentages) among three different cases. In order to be able to establish the impact of an NDM mechanism, some aspects of the three cases differed between groups A and B. A total of 98 coordinators involved in major criminal investigation operations participated in the serious game.

#### *Chapter 4: Decision making by Command Core Teams (CCTs)*

The experimental study included a serious game developed on the basis of a literature review and interviews. The aim was to examine whether Command Core Teams were vulnerable to tunnel vision and other NDM mechanisms. In the serious game, a Com-



mand Core Team had to solve a criminal case under time pressure. The scenario of the serious game was based on a real Major Criminal Investigation case and manipulated with NDM mechanisms. The game consisted of three rounds. Between each round, the teams had to specify which tasks had to be implemented and distribute the available research capacity across these tasks. Depending on the tasks that were implemented, new information became available. In each round the applied rules of thumb, hypotheses and scenarios of the teams were recorded to examine how the teams dealt with the NDM mechanisms which were incorporated into the case. A total of ten CCTs participated in the serious game.

#### *Chapter 5: Ethical leadership of battalion chiefs*

In the study, crew commanders from a fire service completed questionnaires on the extent to which they themselves manifested organizational misbehavior, the extent to which they regarded battalion chiefs to be prototypical group members, and the extent to which battalion chiefs showed ethical leadership behavior. The aim was to examine the extent to which ethical leadership of battalion chiefs is effective in limiting organizational misbehavior. In addition, the mediating effect of prototypicality (i.e. the degree to which subordinates regard their leader as prototypical group member) was studied. In total, 61 of the 97 crew commanders completed the questionnaire. The results were statistically analyzed using SPSS. In addition to the questionnaire, interviews were conducted with battalion chiefs.

#### *Chapter 6: Incident command and control during exercises*

The aim of the study was to examine the contribution of battalion chiefs to response safety and effectiveness. The study consisted of an analysis of video recordings made by cameras mounted on the helmets of battalion chiefs during major realistic exercises with largely identical scenarios. These exercises were also observed in situ and participants and staff members were interviewed. This enabled analysis of the extent to which decisions, described beforehand by the exercise staff as 'essential' to the safety and effectiveness of the operation, were actually issued by battalion chiefs and subsequently executed. In total, 23 battalion chiefs participated in the study.

#### *Chapter 7: Incident command and control during real incidents*

The study consisted of the analysis of video recordings made by cameras mounted on the helmets or shoulders of battalion chiefs during real incidents. The aim of the study was to examine the degree to which battalion chiefs were in control of the incident

response. More specifically, the orders were analyzed, as well as the degree to which subordinates carried out these orders. In total, 9 battalion chiefs participated in the study and 55 incidents were investigated.

## The findings

### *Chapter 3: Forensic decision making by coordinators*

**Table c: Findings Chapter 3**

<b>FADCM findings</b>	
<b>Factfinding</b>	During the experiment, a new NDM mechanism was identified, namely the information impulsion fallacy. Probably due to the assumption that coincidence was unlikely, coordinators assumed that the presence of abundant information on an issue was, therefore, significant. As a result, the coordinators were inclined to assign more research capacity to a case when more detailed information had been provided, though the initial information was irrelevant for prosecution.
<b>Analysis</b>	During the experiment, already established NDM mechanisms also appeared to influence the analyses performed by the coordinators. First, the results suggest that norms and values of the Command Core members influenced the distribution of research capacity across the cases. A child murder was allocated much more research capacity than a prostitute murder, despite the file material being identical. Second, it seems that contextual information influenced the examination of forensic evidence. More research capacity was assigned to a case in which tactical, non-verified information had been provided in addition to the forensic evidence.
<b>Methodological assessment</b>	
<p>The participants of the serious game pointed out that they were not aware of the NDM mechanisms during the play. Most of the participants were surprised by the results. Some of them even refused to believe the results.</p> <p>Triangulation of research findings shows convergence: the results of the serious game are in line with the literature and interviews suggesting that contextual information and emotional variables may affect forensic science decision making. However, as the ecological validity of findings obtained through serious games can be questioned,</p>	

additional participatory research is required in order to gain better insight into the operation of observed NDM mechanisms in the practice of major criminal investigations. Based on this study, we conclude that serious games can be an appropriate method for obtaining a preliminary view on the influences of NDM mechanisms in forensic science decision making.

#### *Chapter 4: Decision making by Command Core Teams (CCTs)*

**Table d:** Findings Chapter 4

<b>FADCM findings</b>	
<b>Factfinding</b>	A reverse variant of the information impulsion fallacy (see above) was discovered: it seems that when only little information is provided about a possible perpetrator, CCT teams are unlikely to assign research capacity to that particular person.
<b>Analysis</b>	The results show that (a) stereotypes played a role in the development of hypotheses and scenarios about what could have been happened; (b) no CCT team attempted to disprove a particular hypothesis or scenario.
<b>Decision making</b>	The serious games show that (a) the danger of tunnel vision was recognized during the playing of the game; (b) CCTs made unintentional use of rules of thumb when deciding what tasks to do, as well as in the distribution of research capacity over the tasks; (c) the decision about the most likely perpetrator was delayed extensively (little focus); (d) political and societal pressure was recognized by the leaders of the CCTs and handled in different ways.
<b>Methodological assessment</b>	
Based on interviews carried out after the serious game, it can be concluded that the CCTs from the semi-urban and rural police forces were much more positive about the quality of the serious game and its potential as a training tool. These teams considered the game to be realistic. In contrast, the CCTs from the larger cities were less positive about the game. These teams felt that they had enough experience. Generally, the CCTs from larger cities supported the view that training-on-the-job should be intensified in major criminal investigation, but particularly for less experienced CCTs in semi-urban and rural police forces. The CCTs from larger cities primarily identified aspects of the game which they felt were different during daily practice. Triangulation of the results from various research methods suggest convergence. In	

the literature there is evidence that criminal major investigation is susceptible to decision-making biases, which is supported by the findings from the serious game. The interviews were set against the results of the serious game. Neither provided indication of a high degree of tunnel vision in major criminal investigation.

Participatory research in addition to a serious game is needed to assess the criticism of participants about the reality level of serious games. It should be noted, however, that serious games are not intended to mimic reality but only some crucial aspects of that reality. An important finding in this regard is that the perception of participants as to the reality of the game, is not a sound indicator with which to assess the ecological validity of results obtained through serious games. These results suggest overall that serious games in conjunction with other research methods can be appropriate for investigating CCT decision making.

#### *Chapter 5: Ethical leadership of battalion chiefs*

**Table e:** Findings Chapter 5

<b>FADCM findings</b>	
<b>Communication</b>	It is presumed in the leadership literature that ethical leadership (defined as the demonstration of normatively appropriate conduct through personal actions and interpersonal relationships, and the promotion of such conduct to followers through reinforcement, two-way communication and decision making) may help to limit organizational misbehavior in (frontline) organizations. The questionnaire completed by crew commanders supports this assumption but only when battalion chiefs are regarded by crew commanders as prototypical crew members. Here we find a paradox: when an ethical leader discusses organizational misbehavior of the group, he dissociates himself from the group and consequently will not be seen as a prototypical leader. However, when he tolerates the organizational misbehavior of the group in order to maintain group prototypicality, he must give up his position as an ethical leader who expresses the norms and values of the organization. Given that the added value of frontline commanders is that they sometimes make decisions which may not be regarded by the group as prototypical (otherwise group members could make these decisions themselves therefore requiring no leadership), the

concept of ethical leadership seems unsuitable for frontline command. Rather, in certain situations frontline commanders should be prepared to act in a non-prototypical manner and, consequently, be considered by subordinates to be unethical leaders. The implication of this finding is that battalion chiefs should monitor the implementation of decisions which may be regarded by crew commanders as unethical, as such decisions may not automatically be implemented.

#### **Methodological assessment**

Both crew commanders and battalion chiefs hold the opinion that investigating ethical leadership in the fire service is useful. Crew commanders found it useful because they are sometimes confronted with 'unethical' behavior of battalion chiefs. Battalion chiefs found it interesting because they wanted to know whether it would be productive to invest in individual relationships with firefighters.

Triangulation of research findings shows divergence. In the survey, crew commanders reported that they exhibit hardly any organizational misbehavior during incidents. The interviews with battalion chiefs, however, show a different picture. Battalion chiefs were able to recall many situations in which crew commanders showed organizational misbehavior during incidents, ranging from not scaling up to not implementing orders. The literature confirms the suspicion that organizational misbehavior may occur in the fire service and states that respondents are unlikely to provide a reliable report on their organizational misbehavior.

Survey research appeared to be a less suitable method of gaining insight into the functioning of frontline commanders. For instance, the scales used in the scholarly literature to investigate ethical leadership were often poorly understood by crew commanders and had to be adjusted. In addition, it seems unlikely that the respondents filled out the questionnaire truthfully: both downplaying and magnifying organizational misbehavior are likely. Participatory research is needed to gain a better understanding of organizational misbehavior in general, and the discrepancies between the statements of crew commanders and battalion chiefs in particular. In this participatory research, attention should be paid to the influence of contextual factors (e.g. why is a decision in one situation regarded as ethical and an identical decision in another situation not?), individual factors (e.g. why do crew commanders accept an order from battalion chief A and not battalion chief B?), and cultural factors (e.g. why does one group regard a decision as ethical and another group do not?). In sum, the conclusion is that survey research alone is not appropriate for investigating complex



and bias-sensitive topics such as organizational misbehavior. It seems better to use participatory observation research method, optionally aided by helmet-mounted cameras.

#### *Chapter 6: Incident command and control during exercises*

**Table f:** Findings Chapter 6

<b>FADCM findings</b>	
<b>Factfinding</b>	The helmet-mounted camera video recordings show that battalion chiefs raised an average of 10 questions about the task environment and 6 about the incident operation. Most of the questions were abstractly formulated and consequently multi-interpretable for crew commanders. The video recordings show that battalion chiefs relied primarily on the information provided by crew commanders. Only 5 of the 23 battalion chiefs conducted a 360-degree survey.
<b>Analyses</b>	The video recordings suggest that battalion chiefs used their reasoning capacity primarily for identifying the tasks, mapping the incident site and subsequently assigning the available units to tasks. During the interviews, battalion chiefs explained that they had used this approach because (a) it had been taught at the Fire Academy and (b) they would be assessed on this. According to the battalion chiefs, monitoring of crew commanders' tasks was unnecessary. After issuing an order, crew commanders should be trusted to appropriately carry out the order. The video recordings suggested this was not always the case.
<b>Decision making</b>	The video recordings and observation revealed that crew commanders and not battalion chiefs made the majority of critical decisions. In all exercises, the observed battalion chiefs failed to make one or more critical decisions related to safety or effectiveness. Battalion chiefs were found to provide very few orders which deviated from decisions taken earlier by crew commanders.
<b>Communication</b>	The video recordings show that, on average, battalion chiefs issued 17 orders. Most orders were related to assigning units

	to tasks. In almost all cases the formulation of the orders did not comply with theoretical requirements of a well-formulated order.
<b>Monitoring</b>	The video recordings show that, on average, battalion chiefs monitored 4 orders. In most cases battalion chiefs monitored these orders by raising a question without having a direct visual sight on the task execution. The questions raised about the task-execution were often abstract and consequently multi-interpretable. The video recordings suggest that most orders were appropriately carried out. In at least two cases it was concluded that the order was not carried as requested by the battalion chief.
<b>Methodological assessment</b>	
<p>The participants were generally positive about the use of helmet-mounted cameras. After the exercise the battalion chiefs reported that they had hardly been aware of the camera. In addition, the camera recordings had provided accurate (and sometimes confronting) insight into the way they had operated during the exercise. Most of the battalion chiefs had felt the exercise environment to be realistic, as opposed to the demanding scenario and high time pressure under which they were expected to operate.</p> <p>Triangulation of results generates complementation. Helmet-mounted cameras provided an accurate view on the functioning of battalion chiefs during exercises. During the video-aided after-action review, the battalion chiefs appeared to be often unaware of their behavior during incidents. This suggests that they did not deliberately act differently because the operation was being recorded. Interviews provided initial insight into the motivation of battalion chiefs for their actions. By including observations as a research method, the initial actions of crew commanders before the battalion chief had arrived at the incident scene could be examined. In addition, in situ observations allowed for the actions of crew commanders and their crew to be better examined. During the examination of the helmet-mounted camera recordings, it appeared that more data could have been gathered during the in situ observation, e.g. the time it took before all casualties were found and rescued. An important methodological finding of the study is, therefore, that multiple data methods are required in order to obtain a deep understanding of the contribution of battalion chiefs to the incident response.</p> <p>A limitation of investigating command and control during exercises is the limited eco-</p>	

logical validity of the findings. A structural problem of exercises is that feedback from the environment is not necessarily realistic. For instance, the interviewed crew commanders pointed out that they would not have carried out certain orders issued by some battalion chiefs if it had been a real incident. In addition, some crew commanders stated that they would not normally have waited for orders from a battalion chief but would have got to work themselves. A further limitation inherent to exercises is that battalion chiefs are likely to behave in a manner they believe their assessors expect, and thus do not exhibit behavior as if in a real incident. Researching command and control in exercises has also some advantages. Exercises with identical scenarios and fully-staffed fire engines (e.g. profchecks) provide an opportunity to examine patterns in command and control practices of different battalion chiefs. Another advantage of a training environment is that a selection bias can be prevented since all battalion chiefs are deemed to participate in the training. The use of helmet cameras in training settings has some limitations, however. First, the quality of the footage and the sound is not always good resulting in battalion chiefs not always being understood or crew commanders operating in the background not being properly visible. Second, knowledge about fire operation procedures is required in order to be able to interpret what is going on in the video recordings. Third, helmet-mounted cameras provide insight only into what battalion chiefs did, but not necessarily why they did it. As these limitations can be overcome in a training environment by using multiple cameras and using additional research methods, the conclusion is that helmet-mounted cameras can provide reliable data about command and control.

#### *Chapter 7: Incident command and control during real incidents*

**Table g: Findings Chapter 7**

<b>FADCM findings</b>	
<b>Factfinding</b>	The video recordings show that the battalion chiefs primarily responded reactively to information from the environment (81%). Battalion chiefs rarely proactively gathered information.
<b>Analyses</b>	The video recordings show that in the majority of cases, battalion chiefs immediately took a decision after finding or receiving a piece of information. This suggests recognition-primed decision making as opposed to rational decision making.

<b>Decision making</b>	BC issued very few orders: in the majority of incidents (51%) no order was issued at all. 45% of the orders studied was issued in 5% of the incidents studied. 71% of the orders was related to incident response and 29% to safety. The majority of orders was issued during major incidents. The video recordings suggest that battalion chiefs rarely issued orders which deviated from decisions taken earlier by crew commanders.
<b>Communication</b>	Based on the video recordings, it can be concluded that the formulation of most orders did not comply with theory on well-formulated orders.
<b>Monitoring</b>	The video recordings show that not a single battalion chief checked whether an order had been adequately understood by a crew commander. In the majority of cases (57%), the battalion chiefs did not monitor the execution of the order. 21% of all given orders was not carried out as it was ordered by the battalion chiefs. No correlation was found between the monitoring of orders and their execution.
<b>Methodological assessment</b>	
<p>Overall, the battalion chiefs were positive about the use of helmet-mounted cameras during real incidents, as they provided them with the opportunity of receiving direct feedback.</p> <p>Triangulation of results generates complementation. The analysis of the video recordings yielded findings in line with the very limited existing research on incident command and control. The interviews revealed that battalion chiefs' perception of their response sometimes differed from the video recordings. Participant observation by various battalion chiefs suggests that the video recordings are representative for the incidents experienced by the battalion chiefs and the way they behave in practice.</p> <p>The use of helmet-mounted cameras as the primary data collection method during real incidents has some limitations. The main limitation is the selection bias given that participants voluntarily decided to cooperate in the study and were free to decide whether they would submit a video recording. In addition, in conjunction to helmet cameras other research methods are required to gain insight into the effects of the response operation, such as post-incident reports in conjunction with interview data obtained from crew commanders and participating battalion chiefs. Nonetheless, helmet cameras are likely to provide the most accurate description of what frontline</p>	

commanders do when in command. A major finding of the study is that research based primarily on retrospective accounts from incident commanders is unlikely to provide a very accurate description of who did what and when. The overall conclusion is, therefore, that a helmet camera is an appropriate primary research method for gaining insight into the daily practices of battalion chiefs.

### Answering the research questions

To date, frontline command and incident command and control have been investigated to a very limited extent. This thesis attempted to provide preliminary insight into the effectiveness of frontline command and incident command and control.

The **first sub-question** presented in this thesis was ‘what is frontline command?’ This thesis defined frontline command as making decisions in the frontline and ensuring that frontline workers carry out these decisions. Based on a literature review, this thesis identified five elements of frontline command: factfinding, analysis, decision making, communication and monitoring (FADCM).

The **second sub-question** was ‘how do frontline commanders in major criminal investigations and the response organization of the fire service perform, how can this performance be explained and what are the possible consequences?’ This question is answered for each FADCM element.

### *Factfinding*

**Table h:** Overall reflections on factfinding

Summary	
<i>Overall finding</i>	The studies suggest that information which frontline commanders receive from their environment plays a significant role in the decision-making process. It appears that frontline commanders act primarily on information which they receive accidentally. It seems that when frontline workers provide information to frontline commanders, frontline commanders are compelled to use it. Often, frontline commanders trust blindly and rely heavily on the information provided by frontline workers. To conclude, it appears that in most cases, frontline commanders responded reac-

	tively to their environment. Proactive information gathering by frontline commanders was rarely observed. A contribution to current literature is the identification of a new NDM mechanism called 'information impulsion fallacy' which suggests that when frontline commanders receive a lot of information pertaining to a certain fact or finding, they are likely to devote further attention to that particular fact or finding irrespective of the relevance of the initial information. In contrast, when only little information is provided to frontline commanders, that information is unlikely to precipitate further investigation.
<i>Possible explanations</i>	A possible explanation may be the richness of sensory stimuli frontline commanders feel obliged to respond to, making it hard for them to search proactively for information in the environment. Another explanation may be that frontline commanders lack the experience to know what information they need to have. A rule of thumb that frontline commanders implicitly may use is that information from frontline workers is often relevant and reliable and therefore should be used.
<i>What are the possible consequences?</i>	In most cases, the way frontline commanders deal with information seems to result in satisfactory decisions. However, as frontline workers' decision making might be susceptible to biases and errors (see Chapter 1 and 2), frontline commanders should be able to proactively search the environment to identify threats that frontline workers are unlikely to notice. This requires that frontline commanders make sure that they use their mental capacity as efficiently as possible and not become distracted by all sensory stimuli in the environment. The information impulsion fallacy may result in the inefficient use of research capacity and is likely to enforce information overload.

## Analysis

**Table i:** Overall reflections on analysis

<b>Summary</b>	
<i>Overall finding</i>	The studies suggest that frontline commanders tend to adopt an intuitive or recognition-primed decision making strategy, hence

	<p>without deliberately considering decision alternatives or discussion. In addition, it also appears that NDM mechanisms such as stereotypes and emotions affect analysis in the decision-making process. The frontline commanders were often unaware of this influence in their decision making. This finding supports the current literature in regard to the forensic confirmation bias. The contribution of this thesis is that this bias can be observed during the playing of a serious game, which seems to be much closer to reality than the experimental studies which were used before.</p>
<i>Possible explanations</i>	<p>According to literature, most decisions that people make are based on RPD, which occurs automatically, involuntary and almost effortlessly. In contrast, deliberate activities such as mental simulation are controlled, voluntary and effortful. They impose demands on limited attentional resources. It may be the case that in most cases, rational decision making such as mental simulation is not required for satisfactory decisions. In addition, it seems that decision makers prefer action to thinking, especially when experiencing time-pressure. Finally, it seems that in education and training of frontline commanders little attention is devoted to the influence of contextual factors and psychological biases and thus the need to activate mental simulation when making decisions.</p>
<i>What are the possible consequences?</i>	<p>In exceptional cases, intuitive decision making may result in unsatisfactory decisions (see Chapter 2). When frontline commanders lack practical experience, rules of thumb learned during education and training may be applied inappropriately. Furthermore, it should be noted that frontline commanders will primarily make a difference if they, in contrast to frontline workers, use a more rational decision-making process such as mental simulation. This helps frontline commanders discover deviations in the environment which frontline workers are unlikely to see because they use primarily the fast, intuitive way of decision making.</p>

## Decision making

**Table j:** Overall reflections on decision making

Summary	
<i>Overall finding</i>	The overall findings suggest that frontline commanders seem to find it difficult to make fundamental decisions. In major criminal investigations, it seems that frontline commanders delay decision making as to 'who did it', in order to prevent the emergence of tunnel vision in the decision-making process. In the organization of the fire response, it seems that most decisions are taken by frontline workers, not frontline commanders (it should be noted that crew commanders are regarded here as frontline workers although they can also be regarded as frontline commanders). In addition, it appears that frontline commanders rarely make decisions which deviate from decisions taken earlier by frontline workers. A similar finding can be identified in major criminal investigations: when frontline commanders receive a lot of information from subordinates on an issue, they tend to follow it up. Conversely, they seem reluctant to assign resources to focus on a possible perpetrator who has not been given prominence by frontline workers.
<i>Possible explanations</i>	A possible explanation is that frontline commanders are more sensitive to error prevention than improving the efficiency of frontline work. Moreover, taking divergent decisions in practice seems to be rare and it seems to be hardly addressed in training environments.
<i>What are the possible consequences?</i>	Not taking fundamental decisions or taking them too late may result in a loss of efficiency and effectiveness, especially in non-routine events.

## Communication

**Table k:** Overall reflections on communication

Summary	
<i>Overall finding</i>	The studies suggest that despite the often inadequate formulation of orders, most orders seem to be implemented in a satisfac-



	tory manner. This implies that in most cases, the questions of whether and how orders are executed depends on the knowledge and experience of frontline workers rather than the incident command and control processes of frontline commanders.
<i>Possible explanations</i>	It seems that in most cases, frontline commanders and workers have a shared mental model about what needs to be done in certain situations. Consequently, there is often no need for a precise formulation of orders. An explanation for the often poorly-formulated orders is the lack of attention to communication aspects in education and training.
<i>What are the possible consequences?</i>	A poorly-formulated order will sometimes not be implemented in a satisfactory way. In exceptional cases, this can have severe consequences.

### *Monitoring*

**Table I:** Overall reflections on monitoring

<b>Summary</b>	
<i>Overall finding</i>	The studies show that the majority of orders are not monitored by frontline commanders. Although most orders were implemented without any monitoring on the part of frontline commanders, the studies show that monitoring of orders is desirable to adjust the actions of frontline workers.
<i>Possible explanations</i>	A typical NDM explanation is that in the majority of cases a lack of monitoring does not have negative consequences.
<i>What are the possible consequences?</i>	In some cases orders (especially when it concerns counter-intuitive decisions) are not implemented appropriately. This may have severe consequences with regard to response safety and effectiveness. Additionally, when not monitoring implementation of frontline tasks, frontline commanders are unable to provide direct feedback, which can be necessary for frontline workers to learn about their performance.

The **third and final sub-question** of this thesis was ‘what can be concluded from using various research methods about the degree to which frontline command and incident command and control can be studied?’

The principal methodological finding of this thesis is that the studies show that a single research method is insufficient for obtaining an adequate understanding of the functioning of frontline commanders. Only by combining different research methods, not necessarily a mix of qualitative and quantitative data collection instruments, can richer and more reliable results be obtained. Serious games, (participant) observation and the use of helmet cameras seem to be suitable methods for investigating different aspects of frontline command and incident command and control.

Another principal finding is that interviews and survey research do not seem to be suitable as primary research methods for the study of frontline command and incident command and control. On some occasions frontline commanders have been found to have different perceptions regarding their performance than is evident from the video recordings from the helmet-mounted cameras. This finding has also practical implications given that many incident evaluations are based primarily on interviews. Given that perceptions of frontline commanders may be unreliable, incident investigators are recommended to use as many data sources as possible and compare the statements of frontline commanders with other interviews and data sources. With regard to survey research, it seems that the reliability of the findings is limited, as there may be countless biases in play which prevent respondents from providing realistic answers.

**Table m:** Summary of methodological findings

<b>Summary of methodological findings</b>	
<b>Interviews</b>	The interview as primary research method is inappropriate for gaining a deep and reliable understanding of frontline command as well as incident command and control. It seems that respondents are unable to provide a reliable account of what happened as a result of various biases which distort their view on the past. In conjunction with other research methods, however, interviews provide insight into the reflections of frontline commanders.
<b>Serious games</b>	Although serious games reflect only some crucial aspects of the real decision making environment, they score relatively high on ecological validity compared to other research methods and therefore seem to be an effective method for investigating real world decision making.

<b>Survey</b>	As a primary research method, survey research seems to be inappropriate for investigating frontline command as well as incident command and control. As with interviews, several factors are in play which limit the validity and reliability of the findings.
<b>Observation</b>	Observation in a research environment enables researchers to obtain a sound understanding of frontline command. Nevertheless, given that the environments in which frontline commanders operate are hard to simulate, additional research methods are necessary to examine whether findings stand in the real world.
<b>Participant observation</b>	Participant observation seems to be one of the best ways to arrive at a thorough understanding of frontline command, but the results can not be generalized unless a large number of observations are obtained. This makes it intensive, a time-consuming and expensive exercise. In addition, the presence of the researcher at the frontline may influence both frontline commander and workers.
<b>Helmet-mounted cameras</b>	Helmet-mounted cameras have largely the same advantages and disadvantages as participant observation, though are much less time-consuming. There are two specific disadvantages compared to participant observation. First, as the participant is able to determine which videos he or she wants to share, there may be a self-selection bias in play. Second, unlike participant observation, it is impossible to put questions to frontline commanders and workers during operations.

This thesis shows that frontline command practices are not easily revealed for researchers. A thorough understanding of frontline command necessitates study designs consisting of multiple research methods, which are unavoidably time consuming and relatively expensive. Furthermore, cooperation from frontline organizations as well as frontline commanders is required in the development of, and participation in, the study. These barriers may explain why so few empirical investigations have been conducted into such an interesting research field. Nonetheless, as is shown in this

thesis, when having access to frontline organizations, it seems that there are ample opportunities to examine frontline command and incident command and control.

The **central research question** of this thesis was ‘how effective is frontline command in major criminal investigations and the response organization of the fire service?’ Based on the previous sub-questions, the following conclusion can be drawn.

Frontline organizations, such as the section of the police organization concerned with major criminal investigation and the fire response organization, assume that frontline command and incident command and control are necessary under certain circumstances in order to effectively carry out frontline tasks. The results of this thesis suggest that the significance of frontline commanders to frontline tasks is far lower than frontline organizations think and consequently want us to believe. It has been found that decision making by frontline commanders is affected by various NDM mechanisms which can result in inefficient and ineffective decisions. In addition, frontline commanders are highly unlikely to make decisions which deviate from the routine behavior of frontline workers. Furthermore, the decisions made by frontline commanders are often poorly implemented, characterized by abstractly formulated orders and with little monitoring effort. Consequently, the assumption that in current practice frontline commanders contribute significantly to frontline work seems to be false.

### **Implications for practice**

The findings of this thesis have multiple implications for practice.

Frontline commanders seem to be often unaware of the pitfalls in their decision making and the way they attempt to implement their decisions. The necessity of following the FADCM steps in the process of making and implementing decisions is poorly understood. Improved education and training on the basis of NDM insights, brought together in the FADCM model, may help raise awareness of the pitfalls of frontline command and incident command and control. It is vital that frontline commanders understand that they may indeed have to deviate from decisions which frontline workers regard as obvious in a particular situation; a requirement which is clearly a challenge as it cannot be learned in a training environment. When actors in a training environment behave atypically, frontline commanders are likely to feel that the train-

ing environment is unrealistic and subsequently become less motivated to improve their skills.

An additional problem is that frontline workers neither welcome orders which deviate from normal practice, nor welcome greater involvement on the part of the frontline commander in their own decision-making. In general, there seems to be support for frontline commanders but only when they make decisions which are in line with decisions frontline workers themselves would make. That is, decisions which match frontline workers' personal beliefs, which are based primarily on their own perception of the incident environment. It seems that frontline workers do not always realize that as a result of various psychological factors frontline commanders may have a better overview of the incident environment and are therefore likely to opt for alternative and often more appropriate decisions. Better education and training can enhance frontline workers' awareness of this aspect.

Although examination of operational practices showed frontline command and incident command and control to be apparently of minor significance, the question remains as to whether, and how, commanders at the frontline could have a more significant role.

There are plenty of situations, either conceptualized in theory or observed in practice, in which frontline commanders could make a difference by identifying and correcting decision making and implementation pitfalls within themselves and among subordinates. In other words, the frontline does not always operate optimally and frontline commanders could compensate for lesser quality at the frontline, a role which they presently carry out to only a limited extent.

In order to draw the greatest benefits from this theoretical added value, a new breed of frontline commanders is necessary who, among other things, should undergo rigorous training. Clearly an area of subsequent concern for frontline organizations would be how best to allocate their education and training budgets. Should they: a) invest in frontline commanders who are to make a difference only in exceptional situations, or b) invest in improving the skills and experience of frontline workers so that they are more often likely to perform optimally, and accept a 'failure' in exceptional situations?

If organizations opt to invest in better quality frontline commanders, at least two elements will require consideration.

First, the tasks and goals of frontline commanders will have to be defined. With regard to major criminal investigations, this thesis demonstrates that frontline commanders are constantly grappling with the tension between precaution (prevention of errors) and efficiency (optimal use of often scarce resources). The thesis further shows that frontline commanders in today's practice tend to opt for precaution, which has a negative impact on efficiency. The discussion which frontline organizations should therefore conduct with internal and external stakeholders should focus on striking a sound balance between precaution and efficacy. The result of this discussion should subsequently provide input for a clearly defined task description for frontline commanders.

Second, frontline organizations should ensure the presence of appropriate framework conditions to enable frontline commanders to operate adequately. This involves not only the organization of an intensive training program for frontline commanders (aimed at increasing formal knowledge and frontline command skills), but also that they should be assigned a broad decision-making mandate during incident management or large-scale investigations. Senior management must support those decisions openly, post-incident. Further, the organization as a whole must be attuned to its frontline responders. This means, for example, that frontline commanders be at a higher level in the hierarchy than the frontline workers they command during incidents or investigations. In addition, frontline organizations should reorganize their operational procedures in order to maximize the experience of frontline commanders (e.g. reducing the number of frontline commanders).

The findings of this thesis also have implications for the organization of crisis management in industrial societies including the Netherlands. In these societies, it is often assumed that it is possible to control frontline work in the acute phase of a crisis from the top-down. From the top-down often implies a three-layer model of command and control (COPI-ROT-BT in the Netherlands). This thesis suggests this assumption to be false. Given that frontline commanders are able to control frontline operations to only a limited extent, little should be expected from the three-layer structure in practice. Consequently, it seems preferable but also unavoidable to endorse the self-organizing behavior of frontline workers at the initial stage of a crisis.

We provide the following recommendations specifically for police organizations responsible for major criminal investigations:

- Give attention to NDM mechanisms in education and training;
- Organize knowledge exchange;
- Be clear about the objective of frontline command.

We provide the following recommendations specifically for the incident response organization of fire services:

- Select frontline commanders who are less inclined to conform to group norms and values and have the mental capacity to use their highly developed analytical skills under time-pressure;
- Review the way in which frontline commanders are currently educated and trained;
- (For frontline commanders): During the response, focus on a single aspect to which you can make a difference as frontline commander;
- (For senior management): Provide visible support to frontline commanders.

### **Implications for future research**

This thesis shows the difficulty of establishing the added value of frontline commanders. However, by using various research methods it seems possible to get a better understanding of the effects of frontline command to frontline operations. In addition, this thesis demonstrates that frontline command is a scientific and societal relevant subject of research. Therefore, further investigation is desired to uncover the effects of frontline command to frontline operations. This research should include the following steps:

1. To examine the performance of frontline operations with and without frontline commanders, first an analytical framework needs to be developed. This framework should measure the following aspects: the performance of the frontline operations (e.g. number of solved crimes or number of saved victims), characteristics of task environment (e.g. number of tasks and complexity), characteristics of frontline commanders (e.g. experience with the tasks to be performed) and characteristics of frontline workers (ibid). Based on the findings in this thesis, it is proposed that the interplay between task characteristics, frontline commanders' characteristics and frontline workers characteristics determines the performance of frontline operations.

2. The analytical framework should be used to examine frontline operations in an experimental condition in which frontline workers perform their tasks with and without frontline commanders. In the case of major criminal investigation, this could imply Operational Core Team (OCT) members play a serious game in which they have to solve a major crime. In the normal condition, a Command Core Team (CCT) is involved in the game and responsible for directing OCT members. In the experimental condition, OCT members have to solve the case without directions from a CCT. In the case of an emergency response, a number of major exercises could be organized in which frontline workers have to operate with (normal condition) and without a battalion chief (experimental condition). In both cases, the analytical framework should be used to measure the frontline operations. The results can be used to improve the analytical framework and may also yield new insights for further investigation.
3. To validate the findings in daily practice, it is recommended to conduct pilot studies within frontline organizations in which different variations of frontline command are tested. In the case of major criminal investigation, for instance, this could be conducting a pilot in which only one CCT member supervises the Operational Core Team. The analytical framework can be used to compare the difference between the pilot and other major criminal investigations. In the case of emergency response, the operations of three districts could be measured. In the first district, the battalion chief responds to all incidents. In the second district, the battalion chief only responds to large-scale or complex incidents (current situation). In the third district, no battalion chief is responding at all. Admittedly, conducting this kind of pilots will not be easy since frontline organizations need to cooperate and the response of battalion chiefs to incidents is rooted in law.
4. When assessing the findings obtained with the analytical framework, the long term effects of frontline command should be taken into account. For example, it could be possible that frontline workers will only perform better without frontline commanders when they are used to it. Ideally, longitudinal research is conducted in which the effects of frontline command are measured over long periods of time. Furthermore, long term research is necessitated to gather a vast amount of data about the effects of frontline command. This makes it better possible to uncover the influence of contextual variables on the performance of frontline workers and frontline commanders.



The following questions could be helpful in the analysis of the data:

*FADCM aspects in relation to personal characteristics of frontline commanders.* Some interesting questions: to what extent does the experience of frontline commanders with a certain type of incident affect how they interpret the D-C-M aspects of FADCM? To what extent can FADCM aspects be taught?

*FADCM aspects in relation to characteristics of frontline workers.* Some interesting questions: Do experienced and less experienced frontline workers require different styles of communication? Or more generally, does the degree of experience relate to the way frontline workers need to be commanded during incidents? To what extent does employment in the fire service (professional or voluntary) influence the way in which frontline workers need to be controlled?

*FADCM aspects in relation to characteristics of frontline organizations.* Some interesting questions: Do culture and technology affect the way frontline commanders deal with FADCM aspects? To what extent are decision support systems helpful for B and C aspects during the incident response?

*FADCM aspects in relation to the effectiveness of frontline command and the incident response.* Some interesting questions: To what extent do frontline commanders perform better when they use models such as FADCM? To what extent does improved application of FADCM aspects result in improvement of the overall incident response?

When insight is obtained in the functioning and effects of frontline command within major criminal investigation and the response organization of the fire service, comparative research is desired. Why does the concept of frontline command works differently in organizations? To what extent is the concept of a frontline commander applicable to other (frontline) organizations? What can police and fire organizations learn from frontline organizations which operate without frontline command?

## Chapter 1. Introduction

*On 9 May 2008, three firefighters lost their lives during fire fighting operations in business premises in De Punt (Drenthe). The three had been trying to reach the fire source by means of an interior attack when the fire suddenly spread. It took about three-quarters of an hour before colleagues were able to reach them, by which time the firefighters were no longer alive. The Helsloot Commission, which carried out a study into the tactics adopted during the fire, concluded that the most senior frontline manager at the scene (the battalion chief) had not been able to 'make a difference' (Helsloot et al. 2010). The Commission also reported that the rescue operation had been inadequately coordinated almost resulting in additional fatalities among the firefighters. Further, the Commission established that the incident had been inadequately scaled up, resulting in a long time gap with too few frontline managers at the incident site. Assessments of other major firefighting operations have produced similar findings (Netherlands Institute for Safety, 2011; The Public Order and Safety Inspectorate, 2011).*

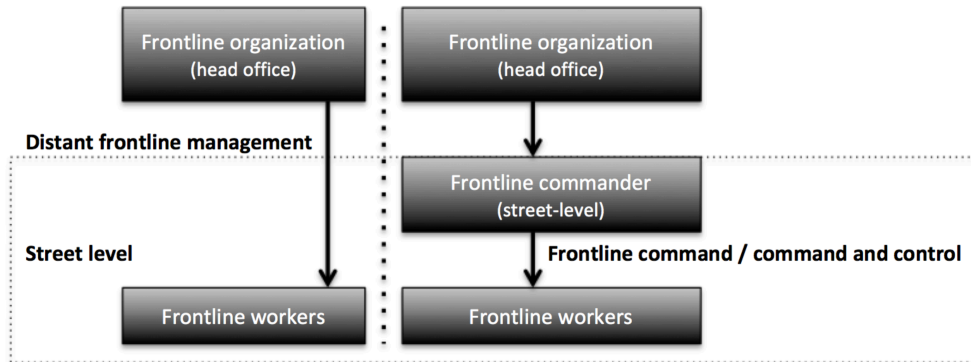
*On 22 June 2000, a boy and a girl were attacked by a man in the Schiedammer park. The girl was raped and murdered. The boy was severely beaten, but survived the attack. In the investigation many mistakes were made. As Beijer (2010) noted: 'the transcripts of the interviews were incomplete; the report of one of the first interrogations was drawn up six weeks after the interview had taken place; in one of the first interviews the police gave an elaborate account of how they thought the crime had taken place. So they had provided information on the crime committed. The suspect was not mistreated or threatened, but he nevertheless falsely confessed. This interview was not videotaped. Later on, a number of interrogations were videotaped, but those were not completely put down in writing. Parts of the interrogation were not written down because they were 'irrelevant' according to the prosecution team. The police and the prosecutor were well aware of the fact that the defendant was unstable, emotional and easy to impress person, but they nevertheless focused only on this person as a suspect even though there were doubts as to the truthfulness of the confession.' The Posthumus Commission, who examined these flaws in the investigation process in 2005, noted that the investigation team felt extreme pressure from political leaders, media and the*

*public to solve the case and found clear evidence of tunnel vision (Posthumus, 2005).*

### **1.1. FRONTLINE COMMAND**

Considerable attention has been devoted in the public administration literature to the functioning of frontline organizations such as social welfare organizations, police and youth care (e.g. Lipsky, 1980). Frontline organizations share several defining characteristics (Gofen, 2014). First, in frontline organizations there are frequent face-to-face interactions between frontline workers and clients. Second, primary tasks are often carried out outside the organization, i.e. distant from the head office. Third, primary tasks are carried out in an ever-changing environment and are difficult to plan in advance. The public administration literature has been primarily concerned with the degree to which frontline workers implement policy in practice and the way frontline organizations attempt to influence policy implementation at the frontline, also referred to as frontline management (Brodkin, 2011).

This thesis is about a barely explored topic in public administration research, that is frontline command. In most frontline organizations, frontline workers solve problems in an environment relatively free of managerial supervision (Henderson & Pandey, 2013). These frontline organizations often attempt to influence the work at the frontline by applying 'distant' management tools, such as performance indicators and training. However, some frontline organizations assume that direct command of frontline workers is necessary for the effectiveness of frontline work and have appointed frontline commanders to meet this presumed need. The direct supervision of frontline workers by frontline commanders is referred to in this thesis as frontline command. Frontline command can be defined as making decisions in the frontline and ensuring that frontline workers carry out these decisions accordingly (e.g. Burke, 1997). Frontline command under high levels of time-pressure, such as in emergency situations, is referred to as (incident) command and control (Brehmer, 2005; Flin & Arburthnot, 2003; Zsombok & Klein, 1997; Burke, 1997).



**Figure 1.1:** Two ways of frontline management

Scientifically very little is known about what frontline commanders do and how they perform. A lot of answers remain unanswered. Why do some frontline organizations believe that direct supervision of frontline work is required to be effective? How do frontline commanders affect frontline work? To what extent are they able to exercise control over frontline workers? How significant are they for the effectiveness of the organization? And is the concept of frontline command also applicable to other frontline organizations? Before these questions can be answered, however, the field of frontline command needs to be explored to identify possible research opportunities and appropriate research methods.

Also in practice there is a need to get a better understanding of frontline command. As shown in the two examples at the beginning of this chapter, there are several cases in which frontline commanders of frontline organizations were unable to ‘make a difference’, unfortunately with severe consequences. There thus seems to be room for improvement in the command of frontline workers. That is not to say that the effectiveness of frontline work is likely to be totally dependent on the effectiveness of frontline command. In fact, much critical frontline work seems to be conducted without direct supervision of frontline commanders (Henderson & Pandey, 2013). The point is that there is only a very small scientific evidence-base that can be used by frontline organizations to understand and improve the functioning of their frontline.

## 1.2. THE TWO FRONTLINE ORGANIZATIONS IN THIS THESIS

This thesis studies frontline command within the part of the police organization responsible for major criminal investigations and incident command and control within the incident response organization of the fire service. These organizations were selected because they put a lot of emphasis on frontline command (e.g. Alison et al. 2007; Flin et al. 1996), they already have received some scholarly attention and because we were able to get relatively easy access to them.

### 1.2.1. MAJOR CRIMINAL INVESTIGATION<sup>1</sup>

**Table 1.1:** About the organization of major criminal investigation

<b>Overview</b>	In the Netherlands, major criminal investigations are carry out by Major Criminal Investigation Teams (MITs, in Dutch <i>Teams Grootchalige Opsporing</i> ). MITs are called 'major' because they are equipped with a permanent commander and operational positions, have more staff compared with other criminal investigation teams and are only assigned to crimes with a high societal impact (murder, rape, arson, robbery involving the use of serious violence, etc.). The Netherlands has a national police force divided into 11 regional police units. Every regional police unit has one or more MITs. No figures are published on the number of TGO cases conducted annually.
<b>Organization</b>	MITs include a Command Core Team (CCT or VKL in Dutch) and an Operational Core Team (OCT or VKU in Dutch). The CCT consists of different frontline commanders with their own task: a team leader (final responsible for the functioning of the team), a tactical coordinator (responsible for the investigating officers), an information coordinator (responsible for the collection of data and the case file), a forensic coordinator (responsible for the forensic investigation), support coordinator (responsible for providing the team with practical support) and an administrative secretary (provides support to the team leader, keeps the logbook up to date

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<sup>1</sup> This description is based on: Groenendaal, J. & Helsloot, I. (2014). Tunnel vision on tunnel vision? A preliminary examination of the tension between precaution and efficacy in major criminal investigations in the Netherlands. *Police Practice and Research*. 1-15.

	<p>and records the decision-making process). The OCT consists of frontline workers with their own expertise such as tactical investigation, forensic investigation and information analysis. The MIT structure has three levels of command: coordinators responsible for directing and supervising the work of front line workers (i.e. OCT members), a team leader who direct the coordinators and a senior police manager from the district or force management, who together with the supervising public prosecutor, is ultimately responsible for the entire MIT. The senior police manager from the district or force management, the supervising public prosecutor and the force management member responsible for criminal investigation (in the event it is not the senior police manager mentioned earlier), make up the 'regional steering group' which is responsible for staffing capacity and allocation and for monitoring strategic and tactical progress of operational MITs.</p>
<b>Frontline commanders under investigation</b>	<p>The focus in this thesis lies on the functioning of coordinators working in major criminal investigation and Command Core Teams. From the viewpoint of these frontline commanders, OCT members are frontline workers.</p>
<b>On the presumed need for frontline command</b>	<p>In the past decade, two improvement programs have been implemented by the Dutch police force that highlighted the importance of frontline command for the effectiveness of major criminal investigation: the ABRIO programme and the Criminal Investigation Reinforcement Programme.</p> <p>The roots of the MIT structure originate in the ABRIO programme. The ABRIO programme was designed to raise the quality of criminal investigations and was managed and operated by a programme bureau of representatives from the police force and the Public Prosecution Service. For major criminal investigations, the ABRIO programme bureau developed the so-called Major Investigation Team framework (<i>Raamwerk TGO, Team Grootschalige Opsporing</i>). This framework was introduced in 2002 and contained proposals to replace the then standby investigation teams with major investigation teams. According to the makers, this was to lead to 'Better results, quality improvement and greater coop-</p>

	<p>eration between the various regions'. According to the architects of the Major Investigation Team framework, the problems it would solve were: (a) the inefficient manner of working among standby investigation teams; (b) poor quality of investigation and (c) the 'unrest' within the police force resulting from working in standby investigation teams. In addition to the introduction of the major investigation teams, the framework included descriptions of the permanent frontline commanders and operational positions within the MITs, and the formation of pools of qualified staff from which the permanent positions could be manned as soon as a major crime took place.</p> <p>The Criminal Investigation Reinforcement Programme was launched by the police in 2005 as a response to an investigation report by the Posthumus Commission on the flaws which occurred during the criminal investigation into the murder of a child in Schiedammer Park in 2000. The programme was largely based on the recommendations of the Posthumus Commission and resulted in several products which had to be implemented by the police forces. One product was a revised version of the Major Investigation Team framework. The most important change was the expansion of the CCT to include an administrative secretary and the provision of additional standards in regard to required competences and diplomas of CCT members.</p>
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### 1.2.2. INCIDENT RESPONSE ORGANIZATION OF THE FIRE SERVICE

**Table 1.2:** About the incident response organization of the fire service

<b>Overview</b>	<p>In the Netherlands, there are 25 regional fire services responsible for the fire services in their geographical area. According to the law, fire services have three core tasks: (a) prevention, reduction and mitigation of fire; (b) limiting the danger to humans and animals in accidents unlike fire; (c) alerting citizens for sudden threats; (d) exploring hazardous materials and carrying out decontamination; (e) advising governments and other organizations in the field of fire prevention, fire fighting and prevention, reduction</p>
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	and mitigation of accidents involving dangerous substances (Article 25 Wet veiligheidsregio's).
<b>Organization</b>	<p>The organization of the incident response is standardized for all regional fire services. In the Netherlands, the fire service uses a hierarchical command and control structure to organize the response to fires and other emergency situations in which the fire service is involved. The structure includes three levels of frontline command. At the bottom of the hierarchy, that is the first level of command, are the crew commander and his crew. Crew commanders are the firemen in charge of a crew of fire fighters and their responding apparatus (i.e. engine, ladder, squad). In minor fires and other emergency situations, crew commanders operate without direct supervision. When 2 or more engines are called upon the scene of the event, a battalion chief will become in charge of the incident response. Battalion chiefs form the second level of frontline command and are in charge of up to 4 crew commanders and their crew. In the Netherlands, battalion chiefs are responsible for the safe, efficient and effective deployment of fire services resources. More specifically, they are responsible for determining priorities, directing the deployment of resources, assigning crew commanders to particular tasks, monitoring the operations, implement orders from the senior fire chief and aligning decision making between the fire service and other emergency services (in major emergencies until a second battalion chiefs is called to the scene). In major incident response operations, a senior fire chief will become in charge of the overall incident response organization. Senior fire chiefs are the third level of frontline command and are in charge of one or more battalion chiefs and the supporting staff.</p>
<b>Frontline commanders under investigation</b>	In this thesis, the functioning of the second level of frontline command is studied, that is the level of battalion chiefs. They are regarded as frontline or incident commanders. Crew commanders and their crew are seen as frontline workers.
<b>On the presumed need for frontline com-</b>	The notion that battalion chiefs are necessary for the effectiveness of frontline work is evident not only from the command and control structure that is used during emergency situations, but



<b>mand</b>	also by the fact that the hierarchical position and tasks of battalion chiefs and other frontline commanders are stated in the Dutch law (e.g. Regeling personeel veiligheidsregio's). In formal education at the Dutch Fire Academy, battalion chiefs are taught to gather all information, make a plan about what to do, divide tasks among the units and control the execution.
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### 1.2.3. FIRST REFLECTIONS ON THE ORGANIZATIONS UNDER INVESTIGATION

From a distance, the police organization responsible for major criminal investigation and the incident response organization of the fire service seem to have some common characteristics. Frontline commanders in both organizations need to solve critical problems (i.e. battling a fire, solving a major crime) in a demanding environment typically rich of sensory stimuli. Sensory stimuli can emanate from the problem at hand (e.g. the smoke of a large-scale fire, a messy crime scene), frontline workers (e.g. information about tasks being conducted), the organization (e.g. a request of information by higher hierarchical decision-makers) and society (media attention). Frontline commanders in both organizations have to operate under pressure. They are expected to solve the problem as fast as they can with only limited resources at their disposal. But there also seem to be differences between both organizations. Although both organizations need to operate under pressure, it seems that frontline commanders of the fire services face higher levels of time-pressure, especially in the first life-saving stage of emergency situations (Zsombok & Klein, 1997). This is also reflected in the definition of emergencies, that is unforeseen, wide-scope and complex incidents that irregularly occur and necessitate immediate action under high levels of uncertainty and time-pressure (Perry & Lindell, 2006). That is not to say that frontline commanders in MITs do not face high levels of time pressure, but it is assumed that this is not typical for everyday MIT practice and furthermore alternated with longer periods of average time-pressure. Another difference between MITs and the organization of the incident response are the potential dangers that frontline commanders and workers face. As there are often potential dangers at the incident site (e.g. collapsing structures or a back draft), it seems that errors of incident commanders of the fire service could have severe consequences for human safety.

### **1.3. PROBLEM DEFINITION**

The aim of this thesis is twofold. As very little is known scientifically about frontline command and incident command and control, the first aim of this thesis is to provide a preliminary view on the effectiveness of frontline commanders in two frontline organizations: the part of the police organization responsible for major criminal investigation and the incident response organization of the fire service. The second aim of this thesis is to contribute to future research by providing a preliminary insight into the degree to which and how frontline command and incident command can be studied, both in an artificial and natural environments.

The central research question of this thesis is:

*How effective is frontline command in major criminal investigations and the response organization of the fire service?*

To answer the central research question, the following sub-questions will be addressed:

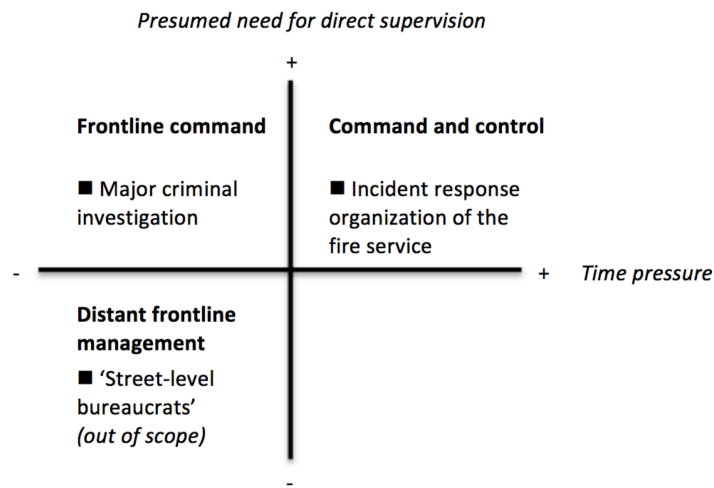
1. What is frontline command?
2. How do frontline commanders perform, how can this performance be explained and what are the possible consequences?
3. What can be concluded from using various research methods about the degree to which frontline command and incident command and control can be studied?

These questions will be addressed by using several research methods to examine different aspects of frontline command in major criminal investigation, and command and control in the incident response organization of the fire service.

### **1.4. LITERATURE ON FRONTLINE WORK AND MANAGEMENT**

In order to assess what is known and unknown in the scientific literature about frontline work and management, a typology is made in which frontline work and frontline management are divided into four categories. This typology will be used to categorize the scientific literature and identify the black spots. The typology includes three categories (see figure). The first category covers frontline organizations in which workers operate free of direct supervision under average levels of time-pressure. In this category, frontline organizations attempt to influence frontline work by distant manage-

ment tools. The second category includes frontline organizations that presume that direct supervision is necessary for the effectiveness of the frontline work. These organizations have to operate under an average level of time-pressure. In this category, frontline organizations attempt to control frontline work by assigning frontline commanders to oversee the work of frontline workers. The third category is almost similar to the second category, but now the frontline organization need to operate under high levels of time-pressure. There may be a fourth category. This category entails frontline organizations working under high level of time-pressure without direct supervision of frontline work. However, no scientific literature was found about frontline organizations that fit this particular category.



**Figure 1.2:** A typology of frontline work and frontline management

As stated before, this thesis focuses on the second and third category of the typology. In the next sections, however, the scientific literature on all three categories will be discussed to provide a comprehensive overview on the scientific knowledge on frontline work and frontline management.

#### 1.4.1. STREET-LEVEL BUREAUCRATS AND FRONTLINE WORK

According to Durose (2009), studies of frontline work in public administration have traditionally been shaped by researchers examining the functioning of organizations from the 'top down'. The top down approach stresses a rational, hierarchical notion of policy-making separation, which makes a sharp distinction between politics and

administration (Durose, 2009; Pressman & Wildavsky, 1973). In this approach, frontline workers are regarded as being responsible simply for the delivery of policy, with any deviation from policy as set out by policy makers being seen as subversive (*ibid.*). In response to this view on frontline work the bottom-up approach emerged. Kaufman (2006) and Lipsky (1980) are well known representatives of the bottom-up approach, emphasizing the discretionary, police making role of frontline workers, by Lipsky (1980) referred to as street-level bureaucrats, and the significant influence of professional values and personal norms in the decision-making process.

Kaufman (2006) studied street-level behavior of USA forest rangers. Based on different qualitative research methods, he concluded that despite attempts to forge a tightly run Forest Service and a nearly all-obeying forest ranger, in the last analysis all influences on administrative behavior are filtered through a screen of individual values, concepts and images' (Kaufman, 2006: 223 as cited in O'Leary, 2010). Lipsky (1980) introduced the concept of street-level bureaucracies, defined as organizations containing individuals who provide public services in direct (face-to-face) contact with clients with a large ability to exercise discretion. Lipsky (1980) studied street-level bureaucrats in schools, police and welfare departments, lower courts and legal services to learn about how frontline workers balance the demands of policy implementation with the priorities of the communities they work within. Lipsky (1980) found that street-level bureaucrats contribute significantly to policy making through exercising discretion in their everyday work. According to Lipsky (1980), street-level bureaucrats use a number of discretion techniques or strategies, including routinizing, modifying goals, rationing their services, redefining or limiting the clientele to be served, asserting priorities and generally, as Durose (2011) put it, developing practices that permit them to process the work they are required to do in some way. Lipsky (1980) concluded that street-level bureaucrats are critical to the success of public organizations as they mark the final step in the policy implementation process (see also Maynard-Moody & Musheno, 2003; Henderson & Pandey, 2013). Therefore street level bureaucrats are often portrayed in public administration literature as policy makers, not simply policy-takers (Gofen, 2014).

According to Lipsky (1980), the ability to exercise discretion is inevitable and necessary for the implementation of policies at the frontline. First, discretion is required since policies are often too complex and abstract to be reduced to programmatic formats (*cf.* Henderson & Pandey, 2013). Second, frontline workers have often make decisions in which people are involved. The implementation of policy in these particu-

lar cases is dependent on frontline workers' understanding of the case and the policy (Lipsky, 1980; Maynard-Moody and Musheno, 2000). Third, street-level discretion promotes frontline workers' self regard and stimulates clients to believe that workers hold the key to their well being (Henderson & Pandey, 2013; Lipsky, 1980).

But street-level divergence does not merely emerge from difficulties in interpreting individual cases and abstract policies. It may also emerge from a rational, ethical or professional choice of frontline workers (Gofen, 2014). O'Leary (2010) introduced the term 'guerrilla government' for actions of public servants (which is broader than frontline workers) who work against the wishes - either implicitly or explicitly communicated - by their superiors. According to O'Leary (2010), guerrilla government is a form of dissent that is usually carried out by those who are dissatisfied with the actions of public organizations, programs or people. Importantly, O'Leary (2010) argued that normative judgment of divergence is often difficult and not straightforward, since the motivation for divergence can range from the altruistic (doing the right thing) to the seemingly petty (I was passed over for that promotion). According to O'Leary (2010) the principal problem of public servants is the problem of ambiguity: they have many masters, competing ethical obligations and multiple directions of accountability. As O'Leary (2010) stated: To some they are brilliant entrepreneurs or guards of the profession, to others they are deviant insubordinates. Gofen (2014) extends this view and identifies two contradictory normative stances in public administration literature regarding divergence in street-level work. On the one hand, Gofen (2014) noted, divergence may reflect a problem that should be corrected. On the other hand, policy makers are seen as policy makers who as experts in their field are able to make effective and efficient decisions about the provision of services. Consequently, they should be provided with the resources and opportunities to utilize their professional abilities (Gofen, 2014). Divergence in this view is thus regarded as a way of customization. Gofen (2014) concludes therefore that divergence can be framed as a problem to be solved or as a force to empower.

#### 1.4.2. DISTANT FRONTLINE MANAGEMENT OF STREET-LEVEL BUREAUCRATS

The question of how to address divergence and to better align street-level actions with policy intentions had motivated many studies (Gofen, 2014). Different tools aimed at influencing street-level behavior have been examined. Brodtkin (2011) studied New Public Management (NPM) strategies of performance-based frontline management based on the premise that it is desirable to 'steer' rather than direct policy work. This strategy assumes (a) that performance monitoring and incentives can be

manipulated to connect discretion toward desired organizational objectives, and (b) that as long as performance benchmarks are met, it is not necessary to consider how frontline work is done (Brodkin, 2011). However, Brodkin (2011) found that street-level workers do more than simply respond to performance incentives, but also adjust to them. This has significant consequences for how policy work at the frontline is done and, ultimately, what is produced as policy on the street-level.

Another tool examined in public administration literature to align frontline work is managerial control (May & Winter, 2009; Riccucci, 2005). Riccucci (2005) explored a number of methods that could be used to influence street-level decision making, ranging from training, engaging workers in decisions about processes, providing feedback and the use of administrative interventions. As Henderson and Pendey (2013) noted, these managerial methods can only be used before or after the frontline work, since managers are often not present at the frontline where the work is carried out. Therefore these management tools are labeled in this thesis as 'distant frontline management'.

In the public administration literature, there is evidence that (distant) frontline management matters to frontline work (Meyers et al. 2007). May & Winter (2009) found that the amount of (distant) supervision and degree of delegation affect the policy emphases of Danish caseworkers in differing degrees and directions, but the managerial influences were relatively weak (less than 5%). Based on a large-scale survey in USA federal agencies, Brewer (2005) found that (distant) frontline supervisors play an important role in organizational performance and effectiveness, and supervisory management is an important determinant of high performance in federal agencies. In addition, Brewer (2005) demonstrated that high-performing agencies tend to have skillful upper-level managers, strong cultures that value employees and emphasize the importance and meaningfulness of the agency's work and policies that empower those employees. In their study on the implementation of a welfare reform policy in the USA, Riccucci et al. (2004) found that management practices matter for the adoption of new goals by frontline workers in established bureaucratic systems and especially the use of performance monitoring. Johansen (2012) examined the effect of (distant) frontline manager quality (she uses the concept of middle manager) in 1000 Texas (USA) school districts on organizational performance. In her research Johansen (2012) found empirical support for the proposition that middle manager quality, as measured with salary residuals, positively influences organizational performance. Brehm and Gates (1997) have more pessimistic view on the influence of street-level

management. Based on surveys, observational studies and administrative records of the performance of public employees, the authors conclude that (distant) supervisors exert relatively little influence on the policy choices of street-level bureaucrats from social services and police. They observed that workers are largely self-regulating. The authors conclude that discretion depends first and foremost on the preferences of individual bureaucrats.

To conclude, the literature on street-level bureaucrats and the management of street-level work provides several insights of interest for this thesis. First, it seems that in most frontline organizations there is no direct supervision of frontline workers. Frontline organizations attempt to influence frontline decision making by distant management tools such as performance indicators and training. Second, without direct supervision, frontline workers exercise discretion when applying policy to concrete cases. Guided by rational, ethical and professional considerations, frontline workers sometimes intentionally chose to deviate from the policies imposed from the organization. As frontline workers operate typically free from direct supervision, the degree to which frontline workers deviate from policy is difficult to assess and monitor for frontline organizations.

#### 1.4.3. FRONTLINE COMMAND IN MAJOR CRIMINAL INVESTIGATION

As stated before, little scientific attention has been devoted to frontline command in general. Several Dutch studies examined frontline command ('frontlijnsturing'), but these studies have used this concept in a different way. Hartman & Tops (2005) for instance regarded frontline command as a way of investigating frontline organizations from the bottom-up instead of from the top-down. Consequently, these research findings do not fit into this section.

This section focuses on frontline command in major criminal investigation. Generally frontline command in major criminal investigations seems to be understudied (Alison et al. 2007 and Tong et al. 2009 made a similar argument). Alison et al. (2007) noted that there is little scientific understanding of the organizational and psychological mechanisms underlying criminal investigation. However, in the scientific literature, there is a growing interest into decision making in criminal investigation and particularly forensic decision making (i.e. decision making about forensic evidence). This section will discuss some of its main findings.

The first stream of research on decision making in criminal investigation is concerned with the accuracy and error in forensic decision making and particularly the influence of contextual information in the decision making process. This stream of research suggests that contextual cues may bias forensic judgments in the criminal justice system (Kassin et al. 2013). Dror and Rosenthal (2008), for instance, found that fingerprint experts judged re-presented stimuli differently when extraneous, contextual information was added. Similarly, Langenburg et al. (2009) reported that the decision-outcome of fingerprint specialists, both novice and experienced, can be influenced by contextual information about the evidence (ibid). In an experimental study, three out of five fingerprint examiners changed their initial identification decision when the same fingerprint was submitted in a different and emotionally charged context (Dror et al. 2006). In a related study, Dror et al. (2005) demonstrated that subliminal messages and emotion both influenced the decision outcome when the fingerprints to be matched were ambiguous. The scholarly debate on whether deviation effects exist still lingers, fuelled by studies reporting that contextual information does *not* affect the decision-outcome. Hall and Player, for instance, presented the same fingerprint in two different criminal contexts and found that the context had no significant effect on the final decision made by the fingerprint examiners (Hall & Player, 2008). However, this study has been criticized for its methodological flaws (Dror, 2009; Saks, 2009).

The second stream of research is concerned with the risk of tunnel vision in criminal investigation decision making. This stream of research does not, at any rate, present a clear-cut picture of the seriousness and scope of the assumed problem of tunnel vision during investigation and prosecution. On the one hand, various experiments have shown that criminal investigation is susceptible to the mechanism which is responsible for tunnel vision, namely confirmation bias: the tendency of police investigators to use the collected information to confirm a previously formulated hypothesis, to search exclusively for indications which confirm this hypothesis, and to ignore exculpatory evidence (Ask & Granhag, 2005). Meissner and Kassin (2002) found, for example, that participants who assumed that suspects had given false statements were not easily persuaded to change their minds. Ask et al. (2008) established that participants exhibit greater trust in evidence if it confirms the existing hypothesis rather than if it refutes it. In similar research, O'Brien (2009) discovered that participants, when half-way through studying a police file, who were forced to formulate a hypothesis as to the perpetrator, subsequently attempted to confirm this hypothesis. On the other hand, there are also experiments which have failed to show confirmation bias. Rassin et al. (2010), for example, found no evidence to support their assumption that police



investigators are by definition more interested in evidence which incriminates a suspect than evidence through which he or she is exculpated.

Two important observations can be made in regard to the studies which demonstrated the existence of a confirmation bias. First, the trust which participants claim to have in evidence or the extent to which they adhere to a previously formed hypothesis, does not automatically indicate the presence of tunnel vision. It may indeed be argued that if participants are able to identify too little positive evidence when establishing an initial hypothesis, the option remains to formulate a new hypothesis. Second, most research into decision making during criminal investigations was carried out among participants without any practical experience, such as law students (for example O'Brien, 2009; Eerland & Rassin, 2012; Ask et al. 2008) and police investigators in training (for example Kerstholt & Eikelboom, 2007). Consequently, the external and ecological validity of these studies seems to be limited.

#### 1.4.4. INCIDENT COMMAND AND CONTROL

The scientific literature on incident command and control can be divided into three categories. The first category is concerned with decision making under time pressure called Naturalistic Decision Making (NDM). In chapter 2 some major NDM theories will be discussed and the corresponding implications for frontline commanders highlighted. This section is concerned with the second and third category.

The second category is about what incident commanders do when they are in command. Rake & Nja (2009) for instance studied command and control in Norway, Sweden and Bosnia-Herzegovina. The authors interviewed 28 experienced incident commanders and observed incident command and control practices of experienced incident commanders in 22 real life incidents, ranging from different fires, scuba rescue and traffic accidents. The results show that incident commanders were usually incremental problem solvers operating within narrow time horizons. In general, incident commanders were found to be more concerned with details than with evaluating the overall situation (which they actually are expected to do). In addition, Rake & Nja note that incident command strategies were often more reactive than proactive and that, in fact, incident commanders rarely command. Most of the incident commanders were found to give very few commands. To conclude, Rake & Nja (2009) demystify the picture of the incident commander as a person who oversees what needs to be done and decisively orchestrates the response at the front line.

Henderson & Pandey (2013) examined direct supervision by medical frontline commanders. The authors held semi-structured interviews with USA paramedics to collect narratives of disagreement or conflict with supervisors during the emergency response. The authors found occasions for compliance and disregard for managerial directives. According to the authors, compliant behavior was evident when patient clinical needs were relatively clear and the effects of the directives were reasonably consistent with the paramedic's preconceived notions of appropriate action. Deviation from managerial directives was apparent when patient's positive outcomes were dependent on ignoring orders. Since Henderson & Pandey (2013) only interviewed frontline workers (i.e. paramedics) and not frontline managers, it should be noticed that these findings only reflect paramedic's perception of patient outcomes.

The third category of literature on incident command and control is concerned with incident commanders' behavior related to good and poor incident command. McLennan et al. (2003) for instance studied incident commanders' behavior by using multiple methodologies such as head-mounted video-cued incident recall interviews in both operational and experimental settings, naturalistic field observations and structured retrospective interviews. The authors present several findings. Most important, the authors failed to find any evidence of a personality type associated with good incident command. According to the authors, good incident command is less a matter of what kind of person an incident commander is, than what he or she does while in command. The authors (2003) reported that good commanders, when compared to poor commanders:

- Knew what information to look for and what to do once they found it;
- Took active steps to control the type of incoming information and the rate at which it was presented. They did so by asking for specific information they believed to be most relevant, delegating particular individuals to find out and communicate need-to-know information and delaying receipt of less immediately relevant information;
- Reduced the load on their working memory by writing down reminder notes on whatever was available;
- Gave closed rather than open-ended orders wherever possible;
- Monitored changes in the situation closely in anticipation of likely problems, changing both their problem-conceptualization and their response tactics quickly as circumstances dictated;

- Attempted to anticipate developments in the situation rather than being forced to react to changes: they endeavored to 'stay ahead of the action'.

In a more specific study, Omodei et al. (2005) explored the beliefs of most military and emergency service organizations that 'more is better' with regard to information resources available to a commander, such as (a) access to detailed information, (b) access to reliable information, (c) direct control over assets and personnel, and (d) amount of communication input from subordinates. The authors conducted four experiments in which a serious game was used to test these assumptions. In all experiments, the participants were fireground commanders and the game was concerned with wildfire scenarios.

- In experiment 1, there were two groups of participants. In one group, the commanders had to rely on subordinates to provide, on request much of their information. In the other group, complete information was continuously provided on-screen to the commanders. The results showed that team performance was significantly better in the incomplete information condition.
- In experiment 2, all participants experienced trials under two conditions: one in which all information was reliable and one in which critical information was known to be unreliable (approximately 50% reliability). The results showed that average team performance was significantly better in the unreliable information condition. According to the authors, the participants' reports of their experiences of the two experimental conditions suggests (a) a felt pressure to work harder to take into account the more reliable information together with (b) a sense of relief when the information was known to be unreliable, providing an 'excuse' not to have to work so hard.
- In experiment 3, there were two groups of participants. In one group, the standard experimental protocol used in experiments 1 and 2 was employed in which the commander was unable to physically direct firefighting appliances, having to rely on his or her subordinate sector controllers to do so following explicit instructions. In the other group, the commander was able to directly deploy firefighting appliances via his or her computer terminal. The results showed that average performance was significantly better in the indirect control condition, with more commander micromanagement being associated with worse performance.
- In experiment 4, one condition was the standard experimental protocol used in all the experiments outlined previously in which subordinates were able to communicate with their commanders insofar as it was necessary to clarify instructions

or to provide information as requested by the commander. The comparison condition employed a one-way communication condition in which subordinates were prevented from talking to their commander. The results showed that there was no difference in performance between one-way and two-way conditions. According to the authors, commanders' expectations were that the two-way (more) would be better than the one-way condition.

The authors concluded that their findings cast serious doubt on any uncritical assumption that more is better with respect to the provision of access to resources by a commander in a time-pressured, distributed dynamic command environment characterized by uncertainty. According to the authors, it seems that in a resource-rich environment, commanders will utilize resources even when their cognitive system is so overloaded as to result in a degradation of performance. The authors point to other effects of such cognitive overload, such as (a) decrement in maintenance of adequate global situation awareness, (b) impairment of high-level strategic thinking, and (c) diminished appreciation of the time scales involved in setting action in train (Omodei et al. 2005).

Crichton et al. (2005) interviewed 7 incident command team members after a serious incident on an offshore drilling rig to identify which command skills were considered to be essential for incident commanders. The authors found that effective performance in incident management is the result of the interplay of people (social and cognitive skills) and structure (organization and knowledge). According to the authors, the effectiveness of incident command and control relied on five key command skills: situation awareness, decision making, communication, team work and leadership. The authors (ibid) argue that the development of these skills contribute to good incident command and, as a consequence, a successful response.

Past studies on incident command and control have advanced our understanding of incident command and control and the behavior related to good and poor incident command and control performance. However, most studies suffer from some severe limitations. First there are methodological problems: some findings are based primarily on retrospective (subjective) accounts of incident commanders. When relying on perceptions of incident commanders, researchers face significant methodological challenges such as hindsight bias, self-justification, blame, incomplete recollection and remoteness in time (cf. Omodei et al. 2005). In providing self-reports, incident commanders may be (unintentionally) able to present an image of the self that is self-

enhancing and self-consistent, resulting in distortion and censoring of data (Omodei et al. 2002).

Second, most of the studies provide only a qualitative description of the results which are often subjective interpretations rather than objective reports. For instance, when McLennan et al. (2003) note that good commanders took active steps to control the type of incoming information, it is interesting to know how many times they did, how, and how big the difference was between lesser and better performing commanders.

Third, most of the studies base incident commanders' performance on expert judgment but fail to describe the criteria that were used to measure performance. For instance, it is unclear what the quantitative criteria are that Rake & Nja (2009) used when they concluded that incident commanders were more concerned with details than with evaluating the overall situation. This problem is also difficult to solve because results are often based on data gathered from realistic exercises using different scenarios, which makes it more difficult to compare the performances of different incident commanders and draw conclusions about what contributes to good and poor performances.

#### **1.4.5. CONCLUSION**

It seems that the existing literature is primarily concerned with the functioning of street-level bureaucrats, normally operating without direct supervision, and the way they are managed from a distance. The concept of frontline command seems to be explored to a limited degree in the public administration literature. In the field of major criminal investigation, scholarly attention has only been devoted to some aspects of frontline decision making. Also incident command and control has been studied to a limited degree. However, these studies suffer from some methodological limitations and therefore the validity of their findings can be questioned. Consequently, research that seeks to extend the current scientific knowledge about frontline command and incident command and control is desired.

#### **1.5. THE CONTENT AND STRUCTURE OF THIS THESIS**

In this thesis, different research methods are used to study one or more aspects of frontline command in the part of the police organization responsible for major criminal investigation and the incident response organization of the fire service. Frontline command includes decision-making and ensuring that frontline workers appropriately

implement these decisions. More specifically, as will be explained in Chapter 2, frontline command can be modeled in five steps: **F**actfinding (i.e. searching for information), **A**nalysis (i.e. analyzing the information), **D**ecision Making (i.e. making decisions about what to do), **C**ommunication (i.e. communicating orders) and **M**onitoring (i.e. checking whether orders are carried out appropriately). These five steps form the FADCM model. In this thesis different aspects of FADCM will be studied to get a better understanding of frontline command and incident command and control.

In total, five studies have been conducted. Two studies are concerned with frontline command in major criminal investigations. Three studies are about incident command and control in the response organization of the fire service. In each study, one or more steps of the FADCM model are investigated. The table below provides an overview of the FADCM aspects that are studied in the studies.

**Table 1.3:** The FADCM aspects under investigation

The studies	Factfinding	Analysis	Decision making	Communication	Monitoring
<b>C3: Forensic decision making by coordinators</b>	X	X			
<b>C4: Decision making by Command Core Teams</b>	X	X	X		
<b>C5: Ethical leadership of battalion chiefs</b>				X	
<b>C6: Incident command and control in exercises</b>			X	X	X
<b>C7: Incident command and control in real practice</b>			X	X	X

In each study, several research methods were used to investigate one or more aspects of the FADCM model. These research methods are shown in the table below.

**Table 1.4:** Research methods used in the studies

The studies	Interviews	Serious game	Survey	Observation	Participant observation	Helmet-mounted cameras
<b>C3: Forensic decision making by coordinators</b>	X		X			
<b>C4: Decision making by Command Core Teams</b>	X		X			
<b>C5: Ethical leadership of battalion chiefs</b>	X			X		
<b>C6: Incident command and control in exercises</b>	X				X	X
<b>C7: Incident command and control in real practice</b>	X				X	X

Chapter 8 provides the answers on the research questions of this thesis. Chapter 9, the final chapter of this thesis, describes the implications for frontline organizations, Incident Command Systems (ICS) and future research.

## Chapter 2. Analytical framework

### 2.1. INTRODUCTION<sup>2</sup>

This chapter describes the analytical framework that has been developed to examine frontline command and incident command and control. In the next paragraph, theories of Naturalistic Decision Making (NDM) will be applied to frontline command and incident command and control. Then, a model will be presented in which the insights of NDM research are categorized. Finally, insight will be provided in different methods to examine frontline practices and a framework will be generated by which the methodological quality of the findings of the studies can be examined.

### 2.2. APPLYING NATURALISTIC DECISION MAKING THEORIES TO FRONTLINE COMMAND

When considering the current literature on frontline management in general and frontline command particularly, it seems that the scholarly knowledge on frontline command is still limited and fragmented across different scientific disciplines. A body of research whose implications are not yet applied on frontline command is Naturalistic Decision Making (NDM). This section brings together existing insights derived from NDM research in a model called FADCM. This model sets out frontline command in five steps, already described in the military science literature. The FADCM model will play a central role in the following chapters, as it will be used to explicate which aspect of frontline command is studied.

#### 2.2.1. NATURALISTIC DECISION MAKING (NDM)

NDM has been defined as: *'How experienced people, working as individuals or groups in dynamic, uncertain and often fast paced environments, identify and assess their situation, make decisions and take actions whose consequences are meaningful to them and to the larger organization in which they operate'* (Zsombok & Klein, 1997:

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<sup>2</sup> This chapter is based on: Groenendaal, J. Helsloot, I. Bruggemans, B. (2014). Het benutten van onderzoek naar Naturalistic Decision Making (NDM): Lessen voor brandweer- en andere leidinggevenden. *Tijdschrift voor Management en Organisatie*. 4, 5-23. And: Groenendaal, J. & Helsloot, I. (in press). The application of research into Naturalistic Decision Making (NDM): lessons for fire chiefs and other frontline managers. *Journal of Management and Organization*.



6). NDM researchers investigate decisions that are characterized by ill-structured problems (not artificial, well-structured problems); uncertain, dynamic environments (not static, simulated situations); shifting, ill-defined or competing goals (not clear and stable goals); action/feedback loops (not one-shot decisions); time stress (as opposed to ample time for tasks); high stakes (not situations devoid of true consequences for the decision maker); multiple players (as opposed to individual decision making) and finally organizational goals and norms (as opposed to decision making in a vacuum) (Zsombok & Klein, 1997). NDM comprises various models which collectively describe and explain the process of decision making by often experienced individuals and/or teams operating under a degree of time pressure and uncertainty while resolving more complex problems. Contrary to normative models of decision making, such as rational choice theories (which postulate that decision makers should aim to make the best possible decision by calculating the likely advantages and disadvantages of each option before choosing the best action), NDM studies attempt to understand how experienced people actually make decisions in their natural environments or in simulated environments that preserve key aspects of natural environments (Kahneman & Klein, 2009).

There are many NDM models and theories such as the image theory (Beach & Mitchell, 1987), explanation based decision making (Pennington & Hastie, 1988), the skill/rule/knowledge based framework (Rasmussen, 1983), decision-cycles (Connolly, 1999), intuitive (system 1) versus analytical (system 2) decision making (Kahneman & Klein, 2009), situation awareness (Endsley, 1995), etc. Recognition primed decision making (RPD), image theory and explanation based decision making are generally regarded as the prototypical NDM model (Lipshitz et al. 2001).

#### 2.2.2. RECOGNITION PRIMED DECISION MAKING

Recognition primed decision making (RPD) explains how experienced decision makers are able to make effective decisions under time-pressure and uncertainty (Klein et al. 1986; Klein, 2008). Based on interviews with more than 30 New York firefighters (both frontline workers and commanders) with an average of 23 years of experiences, Klein et al. obtained retrospective data about 156 highly challenging incidents. The data suggested that in most cases the commanders were not comparing any options (as was commonly suggested in rational theories of choice). They were typically carrying out the first course of action that came to mind. It seems that experienced decision makers were able to use their experience to 'recognize' situations as prototypical cases where certain types of actions are appropriate and usually successful (Klein,

2009). Only when time permits, experienced decision-makers intentionally activated a so-called mental simulation process in which they imagine the course of action, to see if it will work, and to look for unintended consequences that might be unacceptable (Lipshitz et al. 2001). Although RPD was originally developed in the context of (tactical) fire-ground decision-making, it has been identified in many other decision-making environments as well (see Klein 1998 for a review). The principal finding of all these RPD studies is that frontline workers and commanders in the majority of cases make satisfactory decisions (though not always optimal!) on the basis of their experience. This ability is also known as intuition. Nobel prize winner Herbert Simon (1992: 155) described intuition as follows: *'The situation has provided a cue: this cue has given the expert access to information stored in memory, and the information provides the answer. Intuition is nothing more and nothing less than recognition.'*

#### 2.2.3. IMAGE THEORY

The image theory (Beach, 1990; 1993; Beach & Mitchell, 1998) assumes that human decision-making is based on the values, personal principles and strategies (labeled as 'images') of the decision maker. According to the image theory, decisions are made based on whether they fit the personal values, goals and strategies of the decision maker (Morrell, 2004). The personal values or principles of the decision maker reflect a belief in how things should be and how people ought to behave, involving concepts like honor, ethics, ideals, justice, loyalty and truth. In addition to values, the decision maker has an agenda of goals to achieve, goals that are driven by both personal values and the environment. According to Beach & Mitchell (1998), goals can be concrete events (finding fingerprints) or more abstract states (being a good employee). The last image, strategy, contains a plan for reaching the goal. This plan comes from past experience (doing what worked before) but can be adjusted depending on the (expected) situation. According to Beach & Mitchell (1998), the compatibility of a decision with the 'images' of the decision maker is the most important criterion in the decision-making process. In the literature on forensic science, the image theory is reflected in the above-mentioned research on the influence of emotions on fingerprint identification. In the context of the present study, image theory is regarded as a mechanism that influences the decisions of forensic team leaders.

#### 2.2.4. EXPLANATION BASED DECISION MAKING

The explanation-based decision-making model was originally developed by Pennington & Hastie (Pennington & Hastie, 1993a; 1993b) to explain juror decision-making but has since been applied to many domains. The model assumes that decision mak-

ers construct a 'story' or causal representation of the available facts (from different sources of information) and then base their decisions on the constructed narrative. According to Pennington & Hastie (1993a), decision-making involves matching the 'constructed stories' and 'constructed choice' sets. Because the construction of choice sets is specifically concerned with binary decision-making based on the constructed story (like the guilty or not guilty decision of jurors), only the first stage is relevant for this chapter. When forensic scientists construct stories, they build a narrative based on the evidence (facts, statements), their knowledge of similar events (e.g., 'best practices' from the professional community) and their knowledge of story structure (e.g., understanding that human behaviour is goal-oriented). This process results in several narrative representations of the evidences that include causal relationships (1993b). The decision maker chooses the story that best explains all available evidence and seems the most coherent. Apart from the effect of the image theory on the story builder, this process is in accordance with RCT. However, this process is prone to error because decision makers try to fit new information into the existing narrative rather than asking whether this information challenges the constructed story.

#### 2.2.5. WHY FRONTLINE COMMAND IS NEEDED IN SOME OCCASSIONS

In certain cases RPD and other NDM mechanisms can lead to unsatisfactory decisions. Four specific situations can be distinguished:

- First, the frontline worker can be thrown off course when judging the environment. A frontline worker can think that he or she is dealing with a prototypical situation but overlook certain (contradictory) indicators (e.g. Orasanu & Martin, 1998). The fatal fire at De Punt (Drenthe) mentioned earlier, is one such example. The first firefighters to arrive at the scene believed, on the basis of various indicators, that they were dealing with a prototypical fire but were overwhelmed when the fire suddenly spread; in retrospect there had been signs indicating the chance of spread which had been overlooked. In addition, the fireground can be of such magnitude that crews concentrating on a particular area are unable to oversee the entirety. In such instances, decision making on the basis of the situation in a single area is understandable but hardly sensible given the extent of the fire.
- Second, the frontline worker can be misled as a result of his or her own experience. According to Kahneman & Klein (2009) two conditions must be met in order to be able to develop a skilled and intuitive ability to make decisions. First, decision makers must be able to reach valid decisions about the environment on the basis of signals from that same environment. This means that on the one hand, the environment in question must be characterized by adequate predictability

and, on the other hand, that this environment must deliver accurate indicators in relation to the situation. Second, the decision makers must have had the opportunity to familiarize themselves with the incident scene. Decision makers must be, or have been, in a position to recognize relevant signals and the consequences of certain actions in that specific situation. This requires timely and accurate feedback from the environment. If the incident environment does not provide any timely or accurate feedback, it will be impossible for the decision maker to gain reliable insight in the causality between his or her actions and their consequences. Or as astutely stated by Hogarth (2010): You cannot learn from feedback you do not receive and some feedback may simply act to increase confidence in erroneous beliefs. An illustrative example in the Netherlands is the use of so called flashover containers. In these containers a flashover (i.e. a deflagration of fuel rich smoke) can be experienced by firefighters in a controlled environment. The training aims at learning the indications that a flashover is about to happen. The result however is that firefighters are less alarmed by the flash over because they feel that, as in the container, just getting down on your knees will get you out of trouble. In reality a flashover will usually mean that part of the ceiling collapses trapping firefighters or worse. In addition, the frontline worker may be confronted with a situation of which he or she has no previous experience. In such cases most frontline workers tend to make a decision which has worked well in the past and which they can adapt according to the result. And thus the frontline worker learns as he goes, though sometimes with less than desirable results.

- Third, the frontline worker may be confronted with a situation of which he or she has no previous experience. In such cases most frontline workers tend to make a decision which has worked well in the past and which they can adapt according to the result. And thus the frontline worker learns as he goes, though sometimes with less than desirable results.
- Fourth, decision making can be affected by contextual and emotional variables the decision maker is unaware of.

In such cases, frontline workers should in no way be expected to be able to protect themselves from making mistakes. A further core finding from NDM studies is that frontline workers are susceptible to decision-making biases which affect their ability to observe and assess, such as the confirmation bias or the tendency to confirm a previously formed hypothesis by a) interpreting all gathered information as such, b) subsequently search only for signs which validate that hypothesis and c) discount

negative evidence (Ask & Granhag, 2005). A further known bias is that of the sunk cost bias, or the tendency to want to complete a task which is nearing the final phase regardless of circumstances (Meij, 2004). This bias can have serious consequences in firefighting operations. A known phenomenon, for example, is that crews attacking a fire source are reluctant to withdraw even when a fire chief no longer deems it safe to continue an interior attack. At the same time, frontline managers are also susceptible to these and other decision-making biases. Frye & Wearing (2014) drew up a list, specifically in regard to frontline commanders, of common mistakes which occur as a result of these biases: (a) focusing on what is happening in front of them, but losing sight of the bigger picture (or vice versa); (b) focusing on what is happening right now, but losing sight of what might happen next (or vice versa); (c) Focusing on situational awareness, but leaving it too late to make decisions; (d) persisting with a goal, but failing to change plans when the situation changes; (e) accepting responsibility, but micromanaging or failing to escalate issues to others; (f) focusing on safety, but focusing so much on one safety issue that they lose sight of another. As we shall explain later frontline commanders, however, have at their disposal many more possibilities to protect themselves from these errors, such as 'buying time'.

### **2.3. FADCM: TOWARD A MODEL OF FRONTLINE COMMAND**

Various models have been developed within military and aviation sciences which describe steps for successful decision making. Prototypical examples are OODA (Observe, Orient, Decide and Act) (Brehmer, 2000; 2005), DOODA (Dynamic OODA) (Jensen, 2009; Brehmer 2005; 2007), FORDEC (Facts, Options, Risks/Benefits, Decide, Execute and Check) (e.g. Li et al. 2014). These models are quite similar to one another. First, the models are rooted in cybernetics (Ashby, 1956; Morgan, 1982). Cybernetic models are always goal-directed and cyclical. This means that on the basis of acquired information, goals are established and the model is continually applied until the goal, with or without interim adjustments, is achieved. Second, these models have in common that they both distinguish roughly the same four steps: gather more information, analyse the problem, make decisions and check if the desired result has been achieved. Third, these models are developed to aid decision making of individual decision makers who often have to execute the decisions by themselves (such as military pilots).

With regard to incident command and control, quite similar models have been developed. In a study on incident competencies in the London Fire Service, Burke (1997)

incorporated largely the same steps into a model with two main components: deciding and acting. In order to decide, commanders need information. In the decision making process, commanders need to consider their resources and safety and risks. In order to act, commanders need to communicate, control and evaluate. This results in new information which is input for the decision process (Burke, 1997; Burke & Hendry, 1997).

As we wanted to develop a model that connects with the jargon of frontline commanders, we have combined the several steps described in the previously discussed models in the following acronym, FADCM: Factfinding (receiving and gathering of information), Analysis (problem analysis), Decision making (making a decision), Communication (issuing the order), Monitoring (monitoring the implementation of the issued order).



**Figure 2.1:** The five steps of the FADCM model

FADCM is based on assumptions which differ fundamentally from those underlying the problem-solving model (Orientation, Evaluation, Control) developed by Robert Bales and Fred Strodbeck which is currently often used in the training of frontline commanders in the Netherlands. That model assumes that decision makers adhere to a rational process of choice making in which, on the basis of all the information they have gathered, they formulate a series of options which they subsequently consider one by one in order to arrive at the best decision. Nobel Prize winner Herbert A. Simon showed long ago, however, that this is not a 'natural' method of decision making for people (Simon, 1992). Specifically in regard to frontline work Weick (1995), for example, stated that it is impossible for people to form a complete and accurate im-

pression of reality and to retain it. Moreover, Weick stated (ibid) that it is impossible for frontline commanders to focus on all individual aspects of complex problems. In contrast to the model still used frequently in the Netherlands, the FADCM model thus attempts to take account of the way in which people make decisions in their daily working lives. To this end, the FADCM model incorporates insights derived from NDM studies. The model illustrates step-by-step the capabilities and limitations of frontline commanders and how they can apply their knowledge in practice. As far as we know, insights from NDM research have not previously been combined in a single integral modal for frontline command.

The next section discusses, step-by-step through the FADCM model, core insights from NDM research and its practical implications for frontline commanders.

#### 2.3.1. FACTFINDING

The first FABCM step is factfinding. In this stage, frontline commanders have to amass relevant information from the environment. Three core insights from different streams of research play a role here.

The first core insight is that frontline people make decisions based on their perception of reality (Endsley, 1995; Klein, 1998; 2008; 2009). This perception of reality is described in NDM literature as *situation awareness*. Situation awareness involves the completeness and accuracy of an individual's (or group's) perception of a situation and the extent to which the individual can predict the consequences for the near future (Endsley, 1995). According to Endsley (1995), situation awareness comprises three levels: 1) *Perception* of the elements, attributes and symbols in the environment which provide information pertaining to that environment, 2) *Comprehension* of the meaning of the elements, attributes and symbols in that environment, and 3) *Projection* of how the situation will develop in the short term and what action may be necessary. In order to achieve situation awareness, frontline workers have to carry out a *situation assessment*. In this process, frontline workers use their knowledge and experience to create a perception of reality which they use to validate any new information received from the environment. RPD (Recurrent Pattern Detection) plays a prominent part here: when frontline workers, 1) recognise a pattern in their environment, 2) know which solution in the past produced a satisfactory outcome, and 3) are subject to great time pressure and uncertainty, they will tend to immediately opt for that solution.

As explained earlier, this can also mean, however, that despite accurate knowledge and experience, frontline workers can still make wrong decisions if their perception of reality does not correspond to the actual situation. NDM research thus underlines the importance of developing a high level of situation awareness (Montgomery et al. 2005; Cohen et al. 1996). Factfinding is an important element here. The practical implications for frontline commanders is that they should actively search for information and use this to validate their perception of reality in the light of the present situation. In addition, they must validate the accuracy of information they receive from frontline workers and others outside the organisation.

**Firefighting example:**

A small fire breaks out in a nursing home. The fire chief is informed through portable radio by the crew leader that the corridor is full of smoke. The fire chief therefore orders the crew leader to evacuate the bedrooms. If, however, the fire chief had enquired further, he would have discovered that the residents' bedrooms were free of smoke and that there were a number of ways of ventilating the corridor.

The second core insight from psychology research, however, is that people's *attention* and *working memory* are limited (Baddeley, 2003; Kahneman & Klein, 2009; Weick & Sutcliffe, 2011; Catherwood et al. 2012; Endsley, 1995; Forster & Lavie, 2007; 2008; Rees et al. 1997). Only limited amounts of information can be processed (Catherwood et al. 2012). In addition, people notice predominantly that for which they are searching and overlook information which they are not expecting (Endsley, 1995). Moreover, NDM research shows that people who opt for quantity of information (broad focus) as opposed to quality of information, possess generally less situation awareness leading to fewer satisfactory decisions and consequently more mistakes (Catherwood et al. 2012; McLennan et al. 2006). The practical implications of these insights for frontline commanders is that they should be restricted in the number of tasks they perform at one time. This is because of an inherent limited cognitive capacity to gather and process the information pertaining to each task.

The third core insight from social and cognitive psychology research is that people's ability to perceive and assess is influenced by the spatial distance between themselves and the subject of their decision making (Liberman et al. 2007; Trope & Liberman, 2010). For example, from far away, a row of trees appears to be a large deciduous forest, while from a closer perspective it is possible to observe individual trees



but not the size of the forest. The practical implication for frontline commanders is that the distance between themselves and the incident determines how they perceive the incident. Trope & Liberman (2010) therefore recommend observing an object from different spatial distances. For frontline commanders, this means that they should regularly walk 'to' the scene of the incident but certainly also walk 'away' from the scene in order to be able to develop advanced situation awareness. Given that frontline workers often already operate at close proximity to the source, frontline commanders would be well advised to remain at a distance.

### 2.3.2. ANALYSIS

The second step of FADCM is analysis of the situation. At this stage, frontline commanders must assess (their perception of) the situation. This concerns the question of identifying the problem and its significance for the present and the immediate future (Cohen et al. 1996). Two core insights are relevant here.

The first core insight from psychology research is that people have access to two different modes of thought: System 1 and System 2 (Kahneman & Klein, 2009; Stanovich & West, 2000). System 1 is decision making on the basis of recognition which we discussed earlier (Recognition-Based Decision Making, RPD). Although System 1 is by far the most dominant, people do not only make decisions based on experience and recognition. System 2 makes use of people's ability to reason. System 2 is not usually engaged until the initial, intuition-driven approach of System 1 has failed to yield the desired result or when a situation is not immediately recognised (Kahneman & Klein, 2009; Kahneman, 2003). Switching to System 2, however, requires considerable mental effort and, consequently, time (ibid). NDM research shows that:

- Experienced frontline workers make better decisions amidst complex problems when they use System 2 as a validation tool for System 1, but a sense of time pressure usually prevents this from happening (Kahneman & Klein, 2009; Mamede et al. 2010). Engaging System 2 results, among other things, in experienced frontline workers being able to think 'out of the box' more frequently and arrive at creative solutions (Mendonca & Wallace, 2007);
- Inexperienced frontline workers make worse decisions amidst complex problems when they engage System 2 to check System 1 (Mamede et al. 2010).

The practical implication of this core insight is that, in contrast to frontline workers who under perceived time pressure make decisions following rapid recognition of a situation (RPD), frontline commanders must consciously take time to engage System 2.

According to Kahneman (2011; 2003), delaying a decision by ‘buying’ time is one of the most important methods of strengthening reasoning ability. The practical implication for frontline commanders is therefore simply: subject a decision to a final review before issuing the associated order. An organisational implication of this core insight is that frontline commanders must be allowed to gain plenty of experience because only experience allows for the use of System 2 to result in better decisions.

The second core NDM insight is that not only time pressure but also task load influences System 2 (Omodei et al. 2005). When frontline commanders are subject to a heavy cognitive load, for example when having to carry out various tasks simultaneously, perform complex tasks or process large amounts of information at the same time, there is less cognitive capacity available to consciously analyse the situation (Kahneman, 2003; 2011; Catherwood et al. 2012). The practical implication of this core insight for frontline commanders is evident: concentrate on the most critical task and organise backup for tasks which can no longer be carried out.

**Firefighting example:**

In contrast to the Netherlands, fire services in Scandinavia deploy special commanders who concentrate on a single task, for example to keep track of how much breathable air is still available to the firefighters and which crews are in the building. During FADCM training, fire chiefs in the Netherlands are taught to use this principle: request reinforcement for critical tasks which you cannot carry out yourself.

### 2.3.3. DECISION MAKING

The third FADCM stage is decision making. Two core NDM insights are relevant here.

First, ensuring that orders are carried out correctly after a decision has been made requires considerable effort on the part of frontline commanders, particularly when it involves decisions which could be experienced by frontline workers as counterintuitive (e.g. Tissington, 2004). A limitation of Recognition-Primed Decision Making (RPD) is that the majority of actions performed by frontline workers are carried out on autopilot (*skill-based* behaviour). Studies have shown that *skill-based* behaviour and *rule-based* behaviour (conscious application of learned rules) cannot easily be changed during incidents and therefore require considerable ‘supervision’ on the part of frontline commanders (Rasmussen, 1982; Flin & Arburthnot, 2005; Weick, 1993;

1995). By 'supervision' we mean communication and monitoring which we will discuss later in this thesis.

Second, when making decisions frontline commanders must also consider the cognitive limitations of frontline workers. They, too, can process only a limited amount of information and resolve a limited number of problems, particularly when they are complex. In the event of too much pressure, frontline workers run the risk of forgetting or misunderstanding information or orders, particularly when they are complex. (McLennan et al. 2003; 2006). In addition, it is known that excessive pressure on frontline workers can lead to anxiety as to whether they will be able to carry out tasks adequately (Hogarth, 2001; 2003). NDM research shows that anxiety as to personal performance can have an adverse effect on performance because cognitive capacity is overloaded with unproductive stress, such as feelings of fear and uncertainty (Kahneman, 2011: 49; Beilock & Carr, 2005).

The practical implication of these two core insights for frontline commanders is that they should consciously consider whether a decision could be experienced as counter-intuitive by frontline workers and restrict the number of decisions made; not only in order to limit their own task load but primarily to prevent excessive pressure on frontline workers.

**Firefighting example:**

In practice manoeuvres, fire chiefs will sometimes issue crew leaders with a number of different orders at the same time. Assessments have shown that crew leaders often only remember and carry out one or two orders.

#### 2.3.4. COMMUNICATION

The fourth FADCM step is communication. At this stage a decision has to be translated into an order and this order communicated to the frontline workers. The concrete issue is how to communicate an order to frontline workers in the most efficient and effective manner.

Communication has traditionally been regarded as a model containing a transmitter and a receiver which send each other a message and feedback (e.g. Shannon & Weaver, 1949). Research has shown increasingly that, in regard to more complex communication between people whose purpose it is to influence one another, this

model is a wishful model (Conrad & Poole, 2011; Marynissen, 2013). In the type of complex communication at hand, people do not receive 'messages' but interpret information according to their own frame of reference which consists of values, beliefs, goals and cultural aspects (Beach, 1990). Frontline workers who receive information from frontline commanders will interpret the message according to their own frame of reference. The way in which frontline workers carry out instructions depends partly on personal interpretation (Marynissen, 2013; Koschmann, 2013). According to NDM, the notion that instructions are 'self-explanatory' should therefore be abandoned (ibid).

The first practical implication of this core insight is that frontline commanders should formulate an order carefully. On the basis of NDM research, three elements of a well-formulated order can be distinguished (Shattuck & Woods, 2000; Woods & Shattuck, 2000). The order should clarify: 1) intended recipient, i.e. who is to carry out the order. 2) approach, i.e. conditions under which the order is to be carried out, such as when, using which resources, and special areas of attention. 3) goal; what is the goal, why is it important and how will the task contribute to achieving that goal. The second practical implication of the core insight is that frontline commanders must actively verify whether frontline workers have understood the orders they have received.

**Firefighting example:**

A known example from firefighting practices is the order 'Find out if it's safe'. This order does not mention the three elements: intended recipient, approach or goal. The result is the all too common response of 'Yes, it's safe'. For a fire chief there is no indication how this conclusion was reached and whether the crew leader took account of all the necessary indicators.

#### 2.3.5. MONITORING

The fifth and final FADCM step is Monitoring. In this stage, frontline commanders must ensure the correct execution of the communicated order. The majority of empirical research into communication during emergency situations shows that orders are often misunderstood or simply forgotten by subordinates (e.g. Crichton et al. 2005; Shattuck & Wood, 2000). Especially in the case of non-routine orders, explicit monitoring seems to be vital to ensure that the orders are carried out in a correct and timely fashion. The practical implication for frontline commanders is thus: monitor all

orders until they have been carried out by the frontline workers. In the event of lack of time, delegate this task to a colleague frontline commander.

**Firefighting example:**

Assessment of the fire at Koningkerk in Haarlem revealed that the order 'Do not walk in the collapse zone of the church' had not explicitly been monitored by the fire chief. This led to crew commanders and crew continuing to walk through the collapse zone which resulted in a fatal accident (Scholtens & Drent, 2004).

#### 2.3.6. CONCLUSION

This section presented, for each FADCM step, insights obtained from NDM research and described the significance of these insights for frontline commanders leading frontline workers. Overall, the FADCM model presumes that as a result of human factors and practical limitations, frontline workers can only to a very limited degree be supervised and controlled by frontline commanders (cf. McLennan et al. 2006). Frontline commanders can still, however, play an essential part by making decisions which compensate for the shortcomings of frontline workers.

#### 2.4. ON RESEARCHING FRONTLINE COMMAND

In the current scientific literature on frontline management, several research methods have been used to research frontline management. A research method can be defined as a technique for collecting data (Bryman, 2012: 46). The research methods primarily applied in the literature on frontline management are: interviews, simulations or serious games, surveys, observation, participant observation and observation with helmet-mounted cameras. Generally, scholars have identified strengths of limitations of the use of one or more of these methods in their research. This section provides a brief overview these research methods. In the following chapters, the appropriateness of these research methods for studying frontline command will be examined in several studies.

## 2.4.1. INTERVIEWS

**Table 2.1.** Definition, advantages and limitations of interviews

<b>Definition</b>	There are several types of interviews. Individual interviews and focus group interviews, which is a form of interview but with several people. According to Bryman (2012) interviews can be unstructured and semi-structured. In unstructured interviews, researchers use at most a list with some keywords as a brief set of prompts to him- or herself to deal with certain range of topics. According to Bryman (2012), unstructured interviewing tends to be very similar in character to a conversation. In semi-structured interviews, the researcher has a list of questions of specific topics to be covered. According to Bryman (2012: 471), questions that are not included in the guide may be asked as the interviewer picks up on things said by the interviewee, but mostly all the questions will be asked and a similar wording will be used from interviewee to interviewee.
<b>Advantages</b>	The advantage of interviews is that they provide a preliminary insight into street-level practices in a cost-efficient way. As Bryman (2012: 469) noted: <i>'It is the flexibility of the interview that makes it so attractive. Since ethnography entails an extended period of participant observation, which is very disruptive for researchers because of the sustained absence(s) required from work and/or family life, research based more or less exclusively on interviews is a highly attractive alternative for the collection of qualitative data.'</i> Compared to quantitative interviewing, qualitative interviewing tends to be flexible: interviewers are able to respond to the direction in which interviewees take the interview. In addition, interviewers are able to adjust the emphases in the research as a result of significant issues that emerge in the course of interviews (Bryman, 2012: 470).
<b>Limitations</b>	According to Becker & Geer (1957), qualitative interviewing as a research method has some limitations compared to other qualitative research methods such as participant observation. First, when doing interviews, the interviewer can misinterpret the interviewee. As Becker & Geer (1957: 29) stated, researchers <i>'are in somewhat the same position as the anthropologist who must learn a primitive language, with the important difference that we often do not under-</i>

	<p><i>stand that we do not understand and are thus likely to make errors in interpreting what is said to us.'</i> Second, interviewees may not tell the interviewer all the things he might want to know. This may be because interviewees do not want to, feeling that to speak of some particular subject would be impolitic, impolite, or insensitive, because they do not think to and because interviewer does not have enough information to inquire to the matter, or because they are not able to. Third, interviewees may see things through distorted lenses. In an interview things may be reported in such a distorting lens that the interviewer may have no way of knowing what is fact and what is distortion of this kind. According to Becker &amp; Geer (ibid), interviewees may report situations which have not occurred, but which seem to them to have occurred or vice versa.</p>
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#### 2.4.2. SERIOUS GAMES

**Table 2.2:** Definition, advantages and limitations of serious games

<b>Definition</b>	<p>Serious games are defined by Mayer (2009: 828) as '<i>experiential, rule-based, interactive environments, where players learn by taking actions and by experiencing their effects through feedback mechanisms that are deliberately built into and around the game</i>'. According to Mayer (ibid), gaming is based on the assumption that the <i>individual and social learning</i> that emerges in the game can be <i>transferred</i> to the world <i>outside</i> the game. This transfer is largely <i>negotiated</i> and not immediate, thereby making a simulation game low in external risks and giving the players a sense of <i>safety</i>, which according to Mayer (ibid) is a prerequisite for <i>experimentation</i> and <i>creativity</i>.</p>
<b>Advantages</b>	<p>Serious games have several advantages. According to Keys &amp; Wolfe (1990), serious games provide more precise measurements of behavior than field research because decisions are made in a closed organization/environment system, and the similar decision responses are made repeatedly over time. As the environment is known by the researcher, the relationships between the organization and environment can be determined by the researcher in a way that is impossible in field research. In addition, the authors (ibid) note that</p>

	gaming increases interest, involvement and enthusiasm through the competitive element and approached the interest shown in real life experiences. Furthermore, gaming also exceed the excitation of behavior that would occur in real life because of the collapsing of time, making otherwise submerged behavior more observable of measurable. According to Keys and Wolfe (1990), serious games are particularly suited for testing dynamic models of decision making. The authors note that decisinos are difficult to track in the real world because they are made in different parts of the organization at different times. In addition, they provide opportunities to tap participants understanding of interrelatedness of physical and personal factors in the decision making process. They may also be the appropriate laboratory for research with ill-structured and judgmental type problems likely to arise in environments featuring high uncertainty and complexity (Keys & Wolfe, 1990: 324).
<b>Limitations</b>	According to Keys & Wolfe (1990), the weakest aspect of serious games is their lack of generalizability. This is usually a result of the fact that serious games provide a realistic group decision making context, but not a realistic organizational context. Furthermore, due to various reasons it is often hard to run the game with random samples of participants from the larger managerial population under investigation (Keys & Wolfe, 1990). Consequently, serious games are often run with students which negatively affect the generalizability of results. In addition, in spite of the realism serious games generate, the consequences for making suboptimal or wrong decisions are hard to simulate in serious games (ibid). Furthermore, the actual and opportunity costs of developing and running serious games are higher than many other types of simpler experiments (ibid).

#### 2.4.3. SURVEY RESEARCH

**Table 2.3:** Definition, advantages and limitations of survey research

<b>Definition</b>	Bryman (2012: 716) defined survey research as <i>‘a cross-sectional design in relation to which data are collected predominantly by self-completion questionnaire or by structured interview on more than</i>
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	<i>one case (usually quite a lot more than one) and at a single point in time in order to collect a body of quantitative or quantifiable data in connection with to or more variables (usually many more than two), which are then examined to detect patterns of relationship between variables'.</i>
<b>Advantages</b>	According to Rea & Parker (2012), the foremost advantage of survey research is the ability to generalize about an entire population by drawing inferences based on data from a small portion of that population. In addition, the authors note that the cost and time requirements of conducting survey research are significantly less than when the whole population should be studied. Furthermore, surveys can be conducted in a timely fashion. They can be organized so that the actual data gathering is performed in a relatively short period of time. Another advantage of survey research is that it generates standardized data that are extremely amenable to quantification and subsequent statistical analysis (ibid). Although the reliability of data is subjected to a debate, Rea & Parker (2012) argue that survey research allows researchers to collect reliable data, relatively free of researcher-induced biases.
<b>Limitations</b>	Bryman (2012: 179) have listed three general criticisms on quantitative research methods such as surveys. First, it has been argued by researchers that the connection between the measures developed by quantitative researchers and the concept they are supposed to be revealing is assumed rather than real. Quantitative researchers assume that when members of a sample respond to a question on a questionnaire, they interpret the key terms in the question similarly. However, according to Bryman (ibid) respondents do not interpret such terms similarly. Second, there are doubts whether respondents have the requisite knowledge to answer questions in a questionnaire appropriately. Respondents may answer a question designed to measure their opinions or behavior, but their actual behavior may be at variance with their answers. Third, Bryman (ibid) noted that quantitative research methods such as surveys are unable to show how the relationship between two or more variables has been produced by the respondents on whom the research was conducted. More specifically with regard to using

	<p>survey research to investigate (frontline) behavior, Bryman (2012: 271) have listed seven problems: (a) people may vary in their interpretations of key terms in question; (b) when answering the question, respondents may inadvertently omit key terms in the question; (c) respondents may misremember aspect of the occurrence of certain forms of behavior; (d) respondents may exhibit a tendency towards replying in ways that are meant to be consistent with their perceptions of desirability of certain kinds of answers; (e) some questions may appear threatening and result in a failure to provide an honest reply; (f) aspects of the interviewer may influence the answers provided; and finally (e) how people say they are likely to behave and how they actually behave may be inconsistent.</p>
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#### 2.4.4. OBSERVATION

**Table 2.4:** Definition, advantages and limitations of observation

<b>Definition</b>	<p>Observation, also called structured or systematic observation, is a research method in which the researcher employs explicitly formulated rules for the (physical) observation and recording of behavior (Bryman, 2012: 272). It has been implied that structured observation can be viewed as an alternative to survey methods of research (ibid).</p>
<b>Advantages</b>	<p>The main advantage of observation is its capacity to accurately and effectively capture human behavior in natural environments (Bryman, 2012).</p>
<b>Limitations</b>	<p>A commonly critique on observation is that the method is prone to the reactive measurement effect, by which Webb et al. (1966) meant that the researcher subject's knowledge that he is participating in a scholarly search may confound the investigator's data. Webb et al. (1966) distinguished three types related to participant observation: (a) awareness of being tested – participants wanting to create a good impression or feeling prompted to behave in ways that would not normally be exhibited; (b) role selection – individuals seek out cues about the aims of the research and adjust what they say and do in line with their perceptions of those aims; and (c) measurement as a change agent – the fact of a researcher being in a context in which</p>

	no researcher is normally present may itself cause things to be different. In addition, Bryman (2012) noted some other limitations. First, when conducting structured observation, there is a risk of imposing potentially inappropriate or irrelevant framework on the setting being observed. Second, as observation is concerned with directly observable behavior, it is rarely able to get at intentions behind behavior. Third, there is a tendency for observation to generate lots of fragmented data. Fourth, structured observation is prone to neglect the context within which behavior takes place.
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#### 2.4.5. PARTICIPANT OBSERVATION

**Table 2.5:** Definition, advantages and limitations of participant observation

<b>Definition</b>	Participant observation can be defined as a research method in which <i>'the observer participates in the daily life of the people under study, either openly in the role of researcher or covertly in some disguised role, observing things that happen, listening to what is said, and questioning people, over some length of time'</i> (Becker & Geer, 1957).
<b>Advantages</b>	According to Barly & Kunda (2001: 84), the advantage of participant observation over other qualitative research methods is the methods' capacity to capture and reveal emic concepts – the native point of view. According to the authors (ibidem), <i>'grasping the insider's perspective is surely necessary for appreciating the meaning of work and work practices, but for students of work, ethnography's capacity to generate analytic (or etic) constructs that are removed from the native point of view may be just as important. Participant observation forces researchers into direct contact with social phenomena for an extended period of time. As a result, researchers inevitably acquire an appreciation for patterns of work and work contexts of which insiders may be unaware. Identifying such 'etic' concepts is the foundation for building comparative theories because, by definition, insiders are unlikely to have a purview that spans multiple types of work.'</i> According to Bryman (2012: 279), when compared to interviews or surveys, participant observation provides (a) more reliable

	information about events; (b) greater precision regarding their timing, duration and frequency; (c) greater accuracy in the time ordering of variables; and (d) more accurate and economical reconstructions of large-scale social episodes.
<b>Limitations</b>	Just as structured observation, participant observation is prone to the reactive measurement effect as described in before. But there are some other limitations. It is often suggested in literature that the scope of the findings of participant investigation is restricted. As often only a small number of individuals in a certain organization are studied, it is hard to know how the findings can be generalized to other settings (Bryman, 2012: 406). In addition, participant observation is criticized for being too subjective. Findings may relay too much on the researcher's often unsystematic views about what is significant and important, and also upon the close personal relationships that the researcher may build up with the individuals studied (ibid). Also, not all environments lend themselves for participant observation, such as risky environments in which resources, competencies and confidence of the researcher in some way prohibit participation (Brown et al. 2006). Furthermore, participant observation is a time-consuming research method and therefore relatively costly compared to other research methods.

#### 2.4.6. OBSERVATION WITH HELMET-MOUNTED CAMERAS

**Table 2.6:** Definition, advantages and limitations of observation with helmet-mounted cameras

<b>Definition</b>	Observation with helmet-mounted cameras is a research method in which the researcher employs explicitly formulated framework of rules for the observation of events recorded by cameras mounted on the helmet (or shoulder) of the participant. Omodei et al. (1997: 140) have summarized it as follows: 'It involves people wearing small light weight cameras on their heads while carrying out their normal tasks, under instructions to 'wear it and forget it'.
<b>Advantages</b>	Helm-mounted camera's are particularly suited to the study of practices and situations that are difficult for the researcher to access or

	<p>experience in any other way, for example, those involving the holding of equipment or dynamic, highly mobile, fast, dangerous, spatially constrictive or skilled practices (Brown et al. 2008). In these environments, helmet-mounted cameras provide an accurate recording of decision making through the eyes of the subject (Omodei et al. 2002). According to Bryman (2012: 284), these recordings afford researchers the opportunity to review the evidence at length and not rush to a possibly snap decision about what is being observed. According to Omodei et al. (1997; 2002), helmet-mounted cameras have been used with considerable success in naturalistic environments, assisting participants to recall specific and salient mental events (e.g. thoughts, choices, conflicts, uncertainties, feelings, wishes, intentions and also subsequent decisions). The authors note that they have used helmet-mounted cameras to successfully study dynamic decision making in various environments.</p>
<b>Limitations</b>	<p>The limitations of observations based on recordings made by helmet-mounted cameras are similar to some of the observation methods stated above. More particularly, Omodei et al. (1997: 139-140) describe several limitations of helmet-mounted cameras: (a) the camera and/or recording personnel are likely to be intrusive and disrupt the processes being studied; (b) many complex decision making activities in natural settings involve subjects moving rapidly over considerable distances, as at emergency, accident, and disaster sites; (c) many real-world decision settings result in the camera line of sight being frequently blocked; and (d) the camera perspective provides information which differs in important details from that available to the decision maker, such as the camera in a media helicopter versus that of the incident controller of a street riot.</p>

#### 2.4.7. TRIANGULATION OF RESEARCH METHODS

As each specific research method has its own strengths and limitations, generally researchers recommend using multiple research methods to verify results and get insight into possible measuring errors (Johnson et al. 2007). Using multiple research methods is called triangulation. Webb and colleagues (1966) were the first authors who used the term triangulation (Johnson et al. 2007). According to Webb et al (1966: 3): *‘once a proposition has been confirmed by two or more independent measurement*

*processes, the uncertainty of its interpretation is greatly reduced. The most persuasive evidence comes through a triangulation of measurement processes. If a proposition can survive the onslaught of a series of imperfect measures, with all their irrelevant error, confidence should be placed in it. Of course, this confidence is increased by minimizing error in each instrument and by a reasonable belief in the different and divergent effects of the sources of error.'*

Denzin (1978: 291) defined triangulation more briefly as *'the combination of methodologies in the study of the same phenomenon'*. Denzin distinguished between four types of triangulation (cf. Johnson et al. 2007): (a) data triangulation (i.e. use of variety of sources in a study), (b) investigator triangulation (i.e. use of different researchers in the same study), (c) theory triangulation (i.e. use of multiple perspectives and theories to interpret the results of a study), and (d) methodological triangulation (i.e. use of multiple methods to study a research problem. When elaborating more on methodological triangulation, Denzin (1979 in Johnson et al. 2007) separated two types: within-methods triangulation (i.e. the use of either multiple quantitative or multiple qualitative approaches) and between-methods triangulation (i.e. the use of both quantitative and qualitative approaches). Johnson et al. (2007) note that in more contemporary research between-methods triangulation is referred to as mixed methods. The authors (2007: 123) define mixed methods as *'a type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g. use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration.'* Although most researchers nowadays recommend a between-methods triangulation approach (Johnson et al. 2007), Bryman (2012) note that both types of triangulation result in three possible outcomes: convergence, complementary or divergence. Whichever of these outcomes prevail, by using triangulation the researcher is able to construct super explanations of the observed social phenomena. More specifically, Jick (1979) provided the following advantages of triangulation: (a) it allows researchers to be more confident of their results; (b) it stimulates the development of creative ways of collecting data; (c) it can lead to thicker, richer data; (d) it can lead to the synthesis or integration of theories; (e) it can uncover contradictions and (f) by virtue of its comprehensiveness, it may service as the litmus test for competing theories.

#### 2.4.8. A FRAMEWORK ASSESSING THE APPROPRIATENESS OF RESEARCH METHODS

To assess the appropriateness of research methods in the different studies, the methodological quality of research findings will be assessed. According to the literature different criteria can be used to examine the methodological quality of research findings. According to Bryman (2012), the main criteria are reliability (i.e. degree to which a measure of a concept is stable), replication (i.e. other researchers must be able to replicate the findings based on the description of the research procedure), and validity (i.e. a concern with the integrity of the conclusions that are generated from a piece of research).

More specifically, Bryman (2012) distinguishes between two types of reliability: external and internal reliability. The first is concerned with the degree to which the study can be replicated by other researchers. The second has to do with the degree to which different researchers in the same study agree about what they see and hear. In addition, Bryman (2012) list four main types of validity: (a) measurement validity (i.e. the question whether a measure that is devised of a concept really does reflect the concept that it is supposed to be denoting); (b) internal validity (i.e. the question whether a conclusion that incorporates a causal relationship between two or more variables hold water); (c) external validity (i.e. whether the results of a study can be generalized beyond the specific research context; and (d) ecological validity (i.e. the question whether social scientific findings are applicable to people's everyday, natural social settings).

According to Bryman (2012: 47), reliability and measurement validity apply primarily to quantitative research. As this thesis is mainly concerned with qualitative research, emphasis will be placed on internal validity, external validity and ecological validity. However, for the sake of completeness, also internal reliability, external reliability and measurement validity will be incorporated into the analytical framework. In addition, triangulation will be incorporated in the analytical framework to enlarge the confidence in the validity of research findings. Furthermore, as the degree to which the research subject is engaged in a study may impact the way the participant participates in the study, the perception of participants too will be incorporated into the analytical framework.

To conclude, the analytical framework includes the following criteria: internal and external reliability of research findings, measurement validity, internal validity, external validity, ecological validity, triangulation and the opinion of participants.

**Table 2.7:** Framework for assessing the methodological quality of research findings.  
Definitions of the first six criteria are obtained from Bryman (2012)

<b>External reliability</b>	the degree to which a study can be replicated by other researchers.
<b>Internal reliability</b>	the degree to which researchers in the study agree about what they see and hear.
<b>Measurement validity</b>	the question whether a measure that is devised of a concept really does reflect the concept that it is supposed to be denoting.
<b>Internal validity</b>	the question whether a conclusion that incorporates a causal relationship between two or more variables hold water.
<b>External validity</b>	the question whether the results of a study can be generalized beyond the specific research context.
<b>Ecological validity</b>	the question whether social scientific findings are applicable to people's everyday, natural social settings.
<b>Triangulation</b>	the question whether comparing research findings obtained by different research methods convergence, complement or diverge.
<b>Opinion of participants</b>	the opinion of participants about the relevance of the study for daily practice.





## **Chapter 3. Forensic decision making by coordinators**

### **3.1. INTRODUCTION TO THE STUDY<sup>3</sup>**

This chapter uses NDM theories to examine how Dutch coordinators (i.e. police leaders in charge over a team of police investigators) make decisions in real-life settings and identifies some contextual factors that might influence those decisions. The experimental study is primarily concerned with the FADCM aspects 'factfinding' and 'analysis'. First, a focus group interview was conducted to identify four NDM mechanisms in day-to-day forensic decision making. Second, a serious game was conducted to examine the influence of three of these contextual mechanisms.

### **3.2. METHODOLOGY OF THE FOCUS GROUP INTERVIEW**

In order to discover whether NDM models are applicable to coordinators and, if so, which models are relevant, a focus group interview was held. Focus groups are considered a useful method of data collection when relatively little is known about the phenomenon of interest (Wilkinson et al. 2004; Stewart & Shamdasani, 1990). As recommended by NDM scholars (Carroll et al. 2006), the focus group interview was used to get a better understanding of forensic decision-making by coordinators, encouraging them to brainstorm NDM-like decisions that occur in forensic science. The participants in the focus group interview were nine experienced forensic team leaders (average experience of 11 years). In the first stage of the discussion, a total of six NDM models were introduced that might be appropriate to the participants. In the second stage, the participants discussed whether they recognized these models in their daily practice of forensic decision-making. One of the authors acted as moderator for the group, posing questions and sustaining the discussion while a second observer made notes. The focus group interview took about 110 minutes. No questionnaire was used.

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<sup>3</sup> This chapter is based on: Helsloot, I. & Groenendaal, J. (2011). Naturalistic decision making in forensic science: Toward a better understanding of decision making by forensic team leaders. *Journal of Forensic Sciences*, 56(4), 890-897.

### 3.3. RESULTS OF THE FOCUS GROUP INTERVIEW

The participants generated several examples that represented three of the six NDM models: recognition-primed decision making, image theory and explanation-based decision-making theory. For the most part, the other models were not recognized and will thus not be discussed in this chapter. Apart from the presented NDM models, a new mechanism that influenced the participants' decisions was identified: the availability of information motivated the search for additional information. In the following sections, each model/mechanism recognized by the participants will be briefly described and illustrated with examples provided during the focus group interview.

#### 3.3.1. RECOGNITION-PRIMED DECISION MAKING

The participants in the focus group generated many examples of RPD. According to the participants, the first impressions of a forensic research team lead almost automatically to decisions regarding the tactics and methods of forensic research. The participants claimed that these decisions usually prove correct because they quickly generate as much supporting forensic evidence as possible. When asked for specifics, however, most participants provided examples in which the first impression proved incorrect. One of the participants described the following situation:

*I was engaged in research on a devastating fire in a large store. A team member found some cigarette butts in a garbage container located at the back of the store. Therefore, we concluded immediately that the cigarette butts could have caused a smouldering fire. After more thorough research of the garbage container, we concluded that there was no evidence to assume that the fire was intentionally produced. Afterwards, however, a second opinion revealed that the fire most likely started in electronic equipment in the front of the store and almost certainly not in the garbage container.*

In this example, the immediate identification of the probable cause of the fire is an obvious example of a decision based on recognition; the forensic researcher had seen numerous fires started by cigarette butts left in garbage containers. Unfortunately, due to the quick discovery of the cigarette butts, other causes were excluded and thus not systematically researched. No attention was given to the front of the store. Because of time constraints, the participant declared that he had simply not considered any other option. His 'excuse' reveals the influence of time pressure characteristic of a forensic team leader; all participants in this and later sessions stressed that,

under normal daily conditions, there is no time to eliminate all the possible causes of a fire.

### 3.3.2. IMAGE THEORY

The participants of the focus group interview recalled several cases in which emotions, as presumed in the image theory, may have influenced their decision-making process. Two illustrative examples:

*When I investigate what appears to be the accidental death of a young child in his own home, I feel uneasy and want to fulfill my tasks as quickly as possible. This is especially true when the family of the child is still at the crime-scene.*

*I honestly believe that we—forensic team leaders—pay much more attention to child murders than to the murder of prostitutes. And I am sure there are no ‘rational’ grounds to legitimate these preferences. Moreover, I think that media-pressure and the public and political opinions are really pressing these days.*

### 3.3.3. EXPLANATION-BASED DECISION MAKING

A team leader reported an interesting example of this error-producing phenomenon during the focus group interview:

*I remember a case in which a defendant was convicted by the forensic evidence of my team. He was accused of arson in a garage neighboring his own. There was a lot of circumstantial evidence; however, the forensic evidence was decisive. At the first trial, we had shown that the fire was raised through a small hole just above the apparent starting place of the fire—in the wall of the suspect’s own garage. Afterwards, during his appeal, a second researcher revealed that the hole was not made by the suspect, but by a damage expert hired by the insurance company to investigate the damage to the garages. This person had visited the crime scene on the day before we arrived and started our investigation. He, of course, used that spot for making the hole because it was the place where the damage caused by the fire was most extensive.*

This example shows (along with the probable combined effects of time pressure and a ‘petty crime effect’, that is the underestimation of petty crimes by professionals) how easily evidence can be arranged into a suitable, but fallacious, story of the events.

#### 3.3.4. INFORMATION IMPULSION FALLACY

During the discussion with the participants in the focus group interview, a new mechanism was discovered that could influence their decision-making. We call this mechanism the information impulsion fallacy. Predictably, the pressure to come up with irrefutable forensic evidence in high-profile cases leads to a thorough investigation, producing a large quantity of information but also a large number of information gaps or seemingly contradictory pieces of information. These gaps and contradictions require an even larger research capacity. When discussing a few of these cases, the participants concluded that the forensic research should have been stopped earlier because the resulting information would clearly not affect the trial outcome. Looking back on the cases, the forensic team leaders involved with the cases agreed with this assessment. From these examples, it is concluded that, when a large amount of information is available, the perceived goal of forensic research becomes distorted: instead of viewing the information as evidence directed towards an impending trial, the forensic team leaders are motivated to fill in information gaps.

*One of the cases discussed was a well-publicized environmental scandal in the Netherlands. After a devastating fire, it became clear that the ATF waste-processing factory in Drachten did not follow environmental regulations. The smoke from the fire thus contained a great number of toxic substances that polluted the surrounding area for some miles. The forensic and tactical inquiries resulted in a dossier of more than a thousand pages. However, much of the forensic research on the origin and spread of the fire proved, as could be predicted, to be useless during the trial.*

As previously mentioned, the results of the focus group interview were used to develop a course that aimed to make coordinators aware of their non-RCT decision processes. As an introduction to this course, a ‘serious game’ was conducted to help the participants recognize the effect of three of the four previously discussed contextual factors on their own decision-making. The concept serious game refers to the use of simulation techniques in order to research aspects of reality. The serious game is described in the next section.

### 3.4. METHODOLOGY OF THE SERIOUS GAME

The serious game requires the participants to make a sequence of choices regarding the distribution of a forensic team between two and, later, three crimes. These choices are based on information that arrives in multiple pieces, imitating the forensic research process.

#### 3.4.1. PARTICIPANTS

In the above-mentioned course, the serious game was used as a starting point for a discussion on the influence of contextual factors in everyday decision-making. The participants in the serious game were coordinators working in major criminal investigation teams who were attending the course 'process aspects of forensic research' at the Police Academy of the Netherlands between 2005 and 2008. During these years, the serious game was conducted 5 times on a total of 98 coordinators working in major criminal investigation teams.

To investigate whether the results of the serious game were unique to the coordinators, the serious game was also conducted in 2008 with 46 public administration students at the VU University.

#### 3.4.2. DESIGN OF THE SERIOUS GAME IN DETAIL

Three cases were presented to the participants: Micro Electric, Renkum Murder and Happy Slapping. Each case consisted of two versions, A and B. In the serious game, three contextual biases were introduced in either the A or B version. These biases included the presence of tactical 'gossip' (i.e., unverified information from the police inquiry), a difference in the amount of forensic information available, and the presence of a highly emotional context. In each case, these biases were introduced as follows.

- *The Micro Electric* case deals with a fire in a retail store. In the B version, extraneous information explicitly classified as the 'thoughts' of a police detective was added to the police inquiry (*RPD: presence of tactical 'gossip'*).
- *The Renkum Murder* case deals with a family murder. In both versions, the defendant plead guilty; however, the participants were supplied with more detailed information in the A version (*information impulsion fallacy*).
- *The Happy Slapping* case deals with a murder. In the A version, a criminal was murdered; in the B version, a child was murdered (*image theory: highly emotional context*).

The complete case descriptions are presented in the appendix.

#### 3.4.3. PROCEDURE

Participants were randomly separated into two groups, group A and group B. Every five minutes, groups A and B received one or more fiches (i.e. a written piece of information, see appendix) regarding the three cases (one fiche for each case) to simulate the fragmented information flow that characterizes naturalistic environments (26). After 15 and 30 minutes, the groups had to make a decision about the distribution of their team between two and, later three cases. Distribution decisions were made with a 100% capacity and 5% intervals. Each group had to decide what percentage of the team would be distributed to each case based on the available information about the cases. The groups did not know that they each received different information about the cases. The groups wrote the team distribution on a piece of paper that was handed to the instructor. The participants were explicitly asked to make their decisions using only *forensic* information. After 30 minutes, the results were presented and discussed.

### 3.5. RESULTS OF THE SERIOUS GAME

The results of the distribution decisions at 15 and 30 minutes are presented in table 3.1. In table 3.2, we listed the results of the control group. The results in both tables showed that contextual variables dramatically influenced the decision-making of forensic researchers.

The most obvious difference between groups A and B occurred in the Happy Slapping case. Members of group B invested more effort into the child murder case than group A members invested in the ex-criminal murder case *although all participants claimed that they made their decisions using only forensic information.*

In the Micro Electric fire case, tactical information was introduced to the participants in group B. The results showed that, in the first 15 minutes of the game, the B groups were taking into account the unverified statement of a witness who believed that the fire was set to earn money from the insurance company. Compared to the A groups, the B groups spent significantly more time on the case. Once again, however, *all participants claimed that they made their decisions using only forensic information*

In the Renkum murder case, both groups received information that the victim plead guilty. However, the suspect's confession did not explain the precise way the cover-up arson was started. The A groups were provided with much more 'raw' information about the cause of the fire. This information was briefly summarized for group B by giving them the following statement: 'However, some details about the fire starting do not match the fire damage.' As a result, the A groups decided to spend about twenty percent more time on the case relative to the B groups.

**Table 3.1:** Team distribution in %

<b>Experiment 1 (N=18)</b>						
	Group A			Group B		
	Renkum	Micro Electric	Happy Slapping	Renkum	Micro Electric	Happy Slapping
t:15	70	30		50	50	
t:30	35	15	50	20	10	70
<b>Experiment 2 (N=16)</b>						
	Group A			Group B		
	Renkum	Micro Electric	Happy Slapping	Renkum	Micro Electric	Happy Slapping
t:15	75	25		55	45	
t:30	45	15	40	20	15	65
<b>Experiment 3 (N=23)</b>						
	Group A			Group B		
	Renkum	Micro Electric	Happy Slapping	Renkum	Micro Electric	Happy Slapping
t:15	70	30		50	50	
t:30	40	15	45	20	10	70
<b>Experiment 4 (N=22)</b>						
	Group A			Group B		
	Renkum	Micro Electric	Happy Slapping	Renkum	Micro Electric	Happy Slapping
t:15	80	20		50	50	
t:30	40	10	50	15	15	70
<b>Experiment 5 (N=19)</b>						
	Group A			Group B		
	Renkum	Micro Electric	Happy Slapping	Renkum	Micro Electric	Happy Slapping
t: 15	75	25		45	55	
t: 30	40	15	45	15	10	75

*Table explanation: t:x = distribution made after x minutes*



In the discussion held afterwards, the participants did not believe that their decisions were affected by these contextual factors. Both groups demanded insight into each other's files to ensure that there were no forensic differences between them.

Unexpectedly, the results of the control group were almost similar. The NDM mechanisms that influenced the decision-making of experienced coordinators similarly influenced the decision-making of public administration students.

**Table 3.2:** Team distribution in % of control group

<b>Control Group I (N=20)</b>						
	<b>Group A</b>			<b>Group B</b>		
	Renkum	Micro Electric	Happy Slapping	Renkum	Micro Electric	Happy Slapping
t:15	80	20		60	40	
t:30	40	10	50	0	30	70
<b>Control Group II (N=26)</b>						
	<b>Group A</b>			<b>Group B</b>		
	Renkum	Micro Electric	Happy Slapping	Renkum	Micro Electric	Happy Slapping
t:15	65	35		75	25	
t:30	50	35	15	0	20	80

*Table explanation: t:x = distribution made after x minutes*

### 3.6. REFLECTION ON FADCM ASPECTS

#### 3.6.1. FACTFINDING

The results showed that providing the groups with a larger amount of information motivated further information gathering, which we refer to as the information impulsion fallacy. In the Renkum Murder case, the groups that were provided with more information also 'asked' for significantly more research capacity, irrespective of the relevance of the initial information for prosecution. Because the results of the coordinators in the Renkum Murder case are largely identical to the results of the control group, it is proposed that the motivation to gather more information when more information is provided is experience-independent. However, having more information is not always better or, in other words, more information does not automatically lead to better decision-outcomes. In a study on confidence in psychologists, Oskamp (1965), found that the accuracy of the decision outcome did not increase significantly as information increased; however, confidence increased steadily and significantly.

Furthermore, spending research capacity to information irrelevant for the prosecution is inefficient, because the capacity cannot be used for other and perhaps more important major investigations.

### 3.6.2. ANALYSIS

The results also indicated that emotion is a contextual factor that affects forensic decision making by coordinators. The results of the Happy Slapping case revealed that, while the evidence in a murder case is a driving principle in establishing priorities, personal values can also play an important role in the decision-making process. This result is in line with prior research studying the affect of emotional environments on decision-making (Dror et al. 2005; Hall & Player, 2008). Pyrek (2007), in particular, stressed that people's reaction to harm and their need to resolve harm are partially motivated 'by their desire to see justice done'. The Happy Slapping case might indicate that the desire to see justice done is stronger—even for forensic professionals—when the case is perceived as more tragic.

In addition, the results showed that coordinators give primacy to tactical information in the decision-making process. The fact that the participants in group B used the tactical 'gossip' in the Micro Electric case is consistent with both the RPD model and the story-building model. It is found that the tactical information (in the B version) was quickly recognized as a way to relieve time-pressure (RPD). It was also used in the reasoning process according to the explanation-based decision-making theory; the tactical information was recognized as a reasonable explanation of the fire and was used to build a coherent story from the evidence. This finding is in accordance with prior research (e.g. Dror & Charlton, 2006; Langenburg et al. 2009) but also extends previous theories by suggesting that, even when the evidence is indisputably poor, coordinators feel compelled to use it. This result supports the conclusions of Koppl (2005), who observed that forensic scientists are sensitive to what he called 'information pollution'; researchers tend to draw conclusions based on irrelevant, non-verified information that is usually provided by witness testimony or police inquiry. Regretfully, the usual 'masking' technique recommended by for example Saks et al. (2003) won't be effective for coordinators as their work cannot be separated from the crime-scene and the presence of its contextual factors.

Finally, the results showed that the factors influencing the decision-making of the control group were almost identical to factors influencing the forensic experts. On the one hand, this result is not surprising because these mechanisms stem from other

domains and have thus proven to be broadly applicable. On the other hand, it is expected that a professional would be less influenced by emotions than a layperson, an assumption that proved incorrect. This result may reflect the fact the coordinators are controlled by district attorneys, who unquestionably incorporate the ‘popular voice’ in their decision-making process. There is thus no corrective mechanism within the professional hierarchy to counter the effect of emotions.

### 3.7. METHODOLOGICAL REFLECTION

#### 3.7.1. METHODOLOGICAL ASSESSMENT OF RESEARCH FINDINGS

**Table 3.3:** Methodological assessment

<b>External reliability</b>	The external reliability seems to be relatively good as the game can be played without in and outside the police organization. To be able to use the game as a research method, no deep knowledge about the major criminal investigation is required. In addition, during the playing the results can hardly be influenced by the researcher.
<b>Internal reliability</b>	The internal reliability of the research findings seems to be good as both researchers involved in the data collection and analysis interpreted the findings in a similar way.
<b>Measurement validity</b>	-
<b>Internal validity</b>	-
<b>External validity</b>	Although the total number of participants is relatively high (98 participants), participants were not randomly selected from the whole population of coordinators. In addition, group scores were measured and the serious game was only played 5 times. The external validity of the results is thus limited.
<b>Ecological validity</b>	While the research design provides the first insight into the decision-making processes of coordinators, the following caveats regarding the ecological validity should be noted. First, in the serious game, group scores were measured. Although no indications have been seen of group dynamics, the results may be influenced by group

	pressures such as groupthink (McCauley, 1989) and, consequently, be less reliable. In practice, decisions about the distribution of research capacity are generally not made in groups resembled by external researchers. Second, the participants in the serious game had to make decisions regarding simplified cases within a certain amount of time. In practice, decision-makers may have more information at their disposal and they could have more time to decide how much research capacity they will devote to cases.
<b>Triangulation</b>	Triangulation of findings from literature, interviews and serious game suggest convergence. The literature shows that forensic decision making is prone to several contextual biases and during interviews respondents have provided several examples of these biases working in practice. These results validate the findings of the serious game.
<b>Opinion of participants</b>	In all three cases, the respondents believed that they were making purely rational decisions, and some of the respondents initially refused to accept the results. These results indicate that the participants were largely unaware that contextual factors were influencing their decisions. The majority of participants stated that the serious game raised their awareness about contextual and emotional influences in their decision making.

### 3.7.2. COMMENTS ON THE APPROPRIATENESS OF THE RESEARCH METHODS USED

Using a serious game during a course held at the Police Academy of the Netherlands was a relatively cost efficient way of gathering data. Although there are some limitations regarding external and ecological validity of the findings, in general the results suggest that serious games can be used for further systematic inquiry into forensic decision making. For instance, the serious game resulted in a new NDM mechanism which can be tested in future research by various research methods in different research environments. Probably more new NDM mechanisms can be identified by the usage of serious games. Also for practitioners a simple serious game like the one developed in this investigation seems to be valuable. It was surprising to see a strong denial and disbelief by a minority of participants when the results of the serious game

were presented. It appeared that insight into 'real-life' decision making have not penetrated deeply into the criminal investigation community.

## Chapter 4. Decision making by Command Core Teams (CCTs)

### 4.1. INTRODUCTION TO THE STUDY<sup>4</sup>

This chapter uses NDM theories to examine how frontline commanders of Command Core Teams (CCTs) deal with tunnel vision and other potential causes of flawed decision making. The experimental study is primarily concerned with the FADCM aspects 'factfinding', 'analysis' and 'decision making'. A serious game and interviews were used to gather data.

### 4.2. METHODOLOGY

#### 4.2.1. PARTICIPANTS

The serious games were conducted in the second half of 2011. The serious game were played with a total of ten different Command Core Teams from five regional police forces: seven teams were from police forces from large cities, three teams from semi-urban or rural police forces and one team from the Royal Netherlands Marechaussee (responsible for investigations at Schiphol International Airport). All Command Core Team consisted of a team leader and various coordinators (including investigators with managerial positions): specifically, a tactical coordinator (coordinates criminal investigators), a forensic coordinator (responsible for forensic investigations), an information coordinator (responsible for intelligence and special investigation techniques), support coordinator (responsible for facility support) and an administrative secretary (responsible for reports and support to team leader).

The ten Command Core Teams played the serious game in their normal staff positions (without the presence of Operations Core Teams) and in a meeting setting. All the serious games were conducted in the teams' familiar meeting rooms at their respective police stations. The teams were told that they were participating in a study to

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<sup>4</sup> This chapter is based on: Groenendaal, J. & Helsloot, I. (2014). Investigating decision-making mechanisms and biases in Dutch criminal investigation teams by using a serious game. *European Journal of Policing Studies*. 2, 133-157. And: Helsloot, I. Groenendaal, J. Van 't Padje, B. (2012). *Tunnelvisie op tunnelvisie?* Apeldoorn: Politie en Wetenschap. And: Groenendaal, J. & Helsloot, I. (2014). Tunnel vision on tunnel vision? A preliminary examination of the tension between precaution and efficacy in major criminal investigations in the Netherlands. *Police Practice and Research*. 1-15.

determine whether such a game could be used as a training instrument for criminal investigators.

#### 4.2.2. STRUCTURE AND PROCEDURE OF THE SERIOUS GAME

The serious game was made up of three rounds (see Helsloot et al. 2012 for further detail). At the beginning of each round the participants were given written generic information and information specific to their position. The generic information comprised general information about the crime as well as a number of photographs (taken from an original police file from the Major Investigation Teams case). The participants were asked to read and study the information. Then, the teams were asked to discuss the ensuing investigation and specifically determine which activities were to be carried out and by how many people. At the end of each round, we noted the answers on a whiteboard or flip-over. The secretary was asked to document a summary of each round as well as the decisions taken (the investigation resources to be used including staff deployment capacity). The teams had to work under time pressure: the first round lasted thirty minutes, the second and third round each lasted twenty minutes. Time pressure was included deliberately so that the teams' ingrained habits would become visible during the serious game. During each round the team members were able to ask questions or determine new tasks. Depending on the nature of the questions and tasks, the teams were supplied with additional information about the case. In most cases, however, the answer was a simple: 'At this point in the investigation it is not known'. Two other researchers assisted in supervising the game and providing the information to CCTs.

#### 4.2.3. THE SCENARIO OF THE SERIOUS GAME

The scenario of the serious game was based on a real criminal investigation. Helsloot et al. (2012) describes the serious game including the generic and job-specific information which was given to the Command Core Teams during the three rounds, as well as the information provided to them in response to anticipated questions and tasks (which were only made available on request).

The scenario can be roughly described as follows: At 9.30 AM on Friday 23 December 2011 in the Eindweg pub in Lisse, the body was found of a 32-year old man. The body was discovered by someone making a delivery to the pub who immediately telephoned emergency services. The first police officers on the scene found the body of Frank Groot, the pub landlord, behind the bar. The victim was lying on his back and a large pool of blood was visible underneath his head. The officers began sealing off the

crime scene. The crime scene was thus 'frozen'. A coroner arrived on the scene who determined the death of the victim. Given the circumstances, the coroner and the police officers concluded that the victim had died as a result of gunshot wounds. That same day, at a meeting between the public prosecutor and the regional force leaders, it was decided to mobilize a Major Investigation Team. Considerable unrest broke out in the town of Lisse concerning the murder. The media linked the murder to the arrival of asylum seekers. On the Friday afternoon, forensic investigation took place in the pub. The pub appeared tidy inside. The bar stools were on the tables and the ashtrays were empty. There was however a burnt out cigarette stub in the ashtray on the bar and there were cigarette ends on the floor. These were sent to the Netherlands Forensic Institute for DNA analysis. There were stacks of Euro coins on the bar appearing to have been counted. The cash till was empty. Two bullets, two cartridges and one complete round were found. A forensic expert examined the gaming machines for fingerprints. There was no sign of the (murder) weapon.

The following morning various pub regulars got in touch with the police and gave statements. It was interesting to note that according to the regulars, some asylum seekers had visited the pub on the Thursday evening. Asylum seekers did not normally visit the pub. Frank Groot had turned them out of the pub because they had not ordered drinks and were only gambling. The fingerprints of one of the asylum seekers were found on one of the gaming machines in the pub. The last person in the pub, Bob Chorizo, was heard as a witness. He said that he was the last person to leave the pub and had gone home by taxi. The taxi driver confirmed his story and recognized Chorizo from a photograph. Meanwhile, the first DNA results arrived. The cigarette stub showed the DNA profile of John de Bever, a man from near the town of Zaanstad, who was a member of a motor cycle club in Amersfoort with a rather shady reputation. De Bever has served a prison sentence for violent disorder and blackmail. Interestingly, De Bever had not gone to the police in contrast to most of the other regulars. A receipt slip showed that a certain Roeland Datema, a history student at Leiden, had also not yet reported to the police although he, too, had been in the pub on Thursday. The other regulars did not, however, explicitly confirm the presence of Datema in the pub on Thursday evening. Frank Groot's wife and other relatives all had strong alibis: they were at a family gathering in Zeeland and were informed by the police of the murder. The man who lived above the premises and who on Thursday evening had seen two dark-skinned men standing outside the pub had, in the past, filed complaints with the police about noisy motor bikes belonging to pub regulars. He had no alibi but nor were there any indications in the scenario that he was involved in



the murder.

The media was still paying a great deal of attention to the asylum seekers. A number of village residents had now set up a neighborhood watch for the purpose of keeping an eye on the asylum seekers. The Mayor and the public prosecutor consequently requested the force management to work towards a speedy conclusion of the case. A complicating factor, however, was that the force management had received a request from a neighboring regional police force to supply investigators in connection with the start of major sex crime investigation. The force management asked the team-leader to decide whether he would be able to supply investigators to the neighboring force. Information was slowly coming in. The bullets found in the pub turned out to have been fired from a gun used in the murder of a car and motor bike dealer in Veenendaal in 2005. The bullet trajectory investigation in the pub revealed that the gunman must have been standing near the ashtray which held the cigarette butt. A palm print belonging to De Bever was found on the bar stool nearest to the ashtray. Meanwhile, the asylum seekers had been located and had no confirmed alibi. This was also the case, however, in regard to De Bever and various other regulars. The young regular, Datema, transpired to be out of the country. The National Criminal Investigation Service (CIE) suddenly reported that the pub had been under surveillance eighteen months previously in connection with criminal activities surrounding members of a bikers' club in Arnhem who used to visit the pub regularly. During that investigation, a link had never been shown between Frank Groot and members of the biker club.

#### 4.2.4. DECISION-MAKING BIASES IN THE SERIOUS GAME

Several NDM decision making aspects have been selected for further inquiry (see table 4.1.).

**Table 4.1:** Decision making pitfalls in serious game

<b>NDM decision-making aspects</b>	<b>Decision-making pitfalls</b>
Recognition primed decision making (RPD, Klein et al. 1986) – Decisions based on stereotypes	As a result of various stereotypical characteristics, certain suspects receive too much focus in criminal investigations despite a lack of substantive grounds.
RPD – Decisions based on contextual and process-related rules of thumb	A rule of thumb is applied despite the absence of substantive grounds or its use being made explicit.
Explanation based decision making (EBD,	Focus turns into tunnel vision resulting in

Pennington & Hastie, 1992) and confirmation bias – Focuses in criminal investigation	alternative suspects or scenarios being erroneously ignored.
EBD and selective searching – Search for confirmatory evidence	The search for confirmatory evidence outweighs the equally available exculpatory evidence.
Image Theory (Beach, 1990) – Decisions resulting from political or social pressure	Influence from outside the team results in decision making which does not correlate with the facts at hand.
Information impulsion fallacy (Helsloot & Groenendaal, 2011) – Availability of suggestive facts	When little information is known or is made available about a suspect, the person is less conspicuous in the investigation and can easily be overlooked.

For each NDM decision-making aspect we modeled the following potential decision-making pitfalls in the serious game.

*Decisions based on stereotypes:* In the case, we included information on ‘dark-skinned men’ (who were described by the pub regulars as ‘asylum seekers’ though this was not verified) and biking clubs. There was no strong evidence that the ‘asylum seekers’ or the biking clubs were involved in the murder. The decision-making pitfall was that more attention was automatically given to ‘negative’ stereotypes during the decision-making process. *Decisions made using contextual and process-related rules of thumb:* The decision-making pitfall was that a rule of thumb was being applied without being acknowledged and/or without the presence of substantive grounds. *Creating focus within the investigation:* Our scenario contained a number of feasible suspects. The decision-making pitfall is that once a team ‘stumbles’ across such a perpetrator, focus shifts in that direction resulting in tunnel vision. *Searching for confirmatory evidence:* The decision-making pitfall here was that investigators searched only for confirmatory evidence without paying any attention whatsoever to exculpatory evidence or other possible scenarios. *Decisions under political/social pressure:* In the serious game the team leader was urged by the mayor and the public prosecutor to wind up the case as quickly as possible following social unrest concerning the possible involvement of asylum seekers in the murder. What is more, the team leader was also pressured into giving up some of his available manpower. The decision-making pitfall was that social indignation and pressure from management impacted the decision-making process. *Information impulsion fallacy:* The team members were given a lot of information about various pub regulars, the upstairs neighbor and the ‘asylum seekers’, but were

given far less information about two of the other pub regulars. The decision-making pitfall was that the teams wanted to know more about the suspects on whom they already had a lot of information and those about whom they knew less received less attention.

#### 4.2.5. INTERVIEWS

After playing the game, the ten CCTs were interviewed about their perceptions of the serious game and decision flaws in daily practice.

### 4.3. RESULTS

#### 4.3.1. SERIOUS GAME

This paragraph presents the results of the research using a single decision-making aspect or a combination of different decision-making aspects. Each decision-making aspect is illustrated with a typical statement given by team members while playing the serious game.

*Decisions based on stereotypes and contextual rules of thumb.* During the game, all the teams formulated various hypotheses and scenarios. A hypothesis is a description of what could have happened. A scenario is a description of how the incident could have happened based on the various hypotheses. All the teams used both stereotypes and rules of thumb (a guideline or rule based on practice and experience of professionals related to crime and solving cases) in the process of drawing up and formulating hypotheses and scenarios. The difference between being influenced by stereotypes and the use of contextual rules of thumb, however, could not be clearly established in the serious game. The following citation, however, shows one example of how stereotypes did indeed play a part during the interpretation of information.

**Illustrative statement made by various team members:**

*'Those negroid people'* (when referring to the asylum seekers about whom no information as to their race had been provided during the game).

The content of the hypotheses and the scenarios differed considerably. Some scenarios were used by almost all the teams, such as 'criminal biker' and 'trouble with the asylum seekers'. Other scenarios and hypotheses were used only by a few teams. Some rules of thumb contradicted one another. Table 4.2 describes these hypotheses, scenarios and rules of thumb.

**Table 4.2:** Description of hypotheses, scenarios and rules of thumb used by the teams

<b>Hypotheses, scenarios and rules of thumb developed and used during the research</b>	
1. <i>Perpetrator was known to the victim (hypothesis)</i>	Half of the teams formulated the following hypothesis based on the facts provided: 'Because the shot was fired into the back while he was counting money, the victim knew the perpetrator'.
2. <i>It happened after closing time (hypothesis)</i>	Nine of the ten teams drew up the following hypothesis: 'I assume it happened after closing time because the key was in the door and the pub had been tidied.'
3. <i>Robbery with murder (hypothesis)</i>	Because money seemed to have disappeared from the pub, nine of the ten teams described the motive as robbery.
4. <i>Thieves take anything (rule of thumb)</i>	During the serious game, three of the ten teams were critical of the 'robbery with murder' hypothesis because not all the money on the premises had gone: 'It appears to be a robbery but there is still money at the scene.' This fact could have invalidated the 'robbery with murder' hypothesis. Another team stated: 'Money was still lying on the bar and we need to know about the safe; it seems unlikely it was a robbery.' These teams assumed that all the money is always taken during a robbery. None of the teams, however, elucidated on this assumption.
5. <i>Domestic problems (hypothesis)</i>	Six of the ten teams mentioned motives linked to domestic issues. The teams wanted to know if the pub landlord and his wife had financial or marital problems.
6. <i>Tension concerning the asylum seekers (hypothesis)</i>	Six of the ten teams mentioned the possibility of the asylum seekers having committed the murder. They had been turned out of the pub and could have been angry. All these teams mentioned a financial motive on the part of the asylum seekers as a possible motive.
7. <i>The asylum seekers did not do it (hypothesis)</i>	Most of the teams (six of the ten) did not seem convinced about the 'tension concerning asylum seekers' hypothesis in the light of the first and second hypotheses: why would the pub landlord have let the asylum seekers in after closing time and then count money and turn his back on them? Four teams formulated explicitly that the asylum seekers had not done it.

8. <i>Noise nuisance / neighbor conflict (hypothesis)</i>	Half the teams mentioned the 'noise nuisance / upstairs neighbor' scenario. Their hypothesis was that the neighbor had shot the landlord in response to noise from the pub.
9. <i>The last visitor did it (rule of thumb)</i>	Four of the ten teams examined the hypothesis that the last visitor in the pub had done it.
10. <i>The criminal biker club (scenario)</i>	Eight of the ten teams regarded the criminal biker club as a relevant and suspicious factor. One or two teams formulated a scenario such as: 'The biker club took revenge on the pub landlord because they think he talked about them to the police'. In most cases, the teams did not sketch a storyline but made do with such words as: 'Then it's the usual biker story'.
11. <i>De Bever (scenario)</i>	<p>All the teams regarded De Bever as the most likely suspect. The storyline they constructed contained the following elements:</p> <ul style="list-style-type: none"> <li>• He was known to the pub landlord.</li> <li>• He could have returned on his bike after closing.</li> <li>• His cigarette was in the ashtray with a long cone of ash still attached while all the other ashtrays were clean. This ashtray lay in the line of fire.</li> <li>• His palm print was found on the bar and the stool was in the firing line.</li> <li>• He had connections to the criminal biker club.</li> <li>• He had previously been convicted for a crime.</li> </ul>
12. <i>No such thing as coincidence (rule of thumb)</i>	All the elements of the De Bever scenario were 'added up' by the teams. Their comments included: 'All too much of a coincidence' and 'So many boxes here are ticked.' Given such comments and the fact that De Bever was given priority during the investigation, the teams were responding to the rule of thumb that there is no such thing as coincidence. This applied to seven of the teams.

Table 4.3 illustrates the various hypotheses, scenarios and rules of thumb adopted by the teams.

**Table 4.3: Hypotheses, scenarios and rules of thumb per team**

<b>Hypotheses, scenarios and rules of thumb per team</b>													
	1. Perpetrator known to victim	2. Happened after closing	3. Robbery with murder	4. Thieves take everything	5. Relationship issues	6. Trouble with asylum seekers	7. Asylum seekers innocent	8. Disturbance or neighbor conflict	9. The last one did it	10. Criminal biking club	11. De Bever	12. No such thing as coincidence	Total
Team 1	X	X	-	-	-	X	-	-	X	X	X	X	7
Team 2	X	X	X	-	-	X	-	X	-	X	X	X	8
Team 3	-	X	X	X	-	X	X	-	-	X	X	-	7
Team 4	-	X	X	-	X	-	X	X	-	X	X	X	8
Team 5	-	X	X	-	X	-	X	-	-	X	X	X	7
Team 6	X	X	X	-	X	X	-	X	-	X	X	X	10
Team 7	-	-	X	X	X	-	-	-	X	-	X	X	7
Team 8	X	X	X	-	X	X	-	X	X	X	X	-	10
Team 9	X	X	X	X	X	X	X	X	-	X	X	X	11
Team 10	-	X	X	-	-	-	-	-	X	-	X	-	4
Total	5	9	9	3	6	6	4	5	4	8	10	7	

*Table explanation: X = adopted | - = not adopted*

*Process-related rules of thumb.* Table 4.4 shows whether a team gave explicit attention to a particular investigation tool. For example, whether or not a team deployed a family investigator.

**Table 4.4: Deployed investigation tools per team**

Deployed investigation tools per team													
		1. Telephone tapping	2. Telephones victim	3. Alibi witness check	4. Historiography	5. CCTV and telephone masts and other volatile data	6. Family detective	7. Neighborhood investigation	8. Dactyloscopic investigation	9. Investigation into shots (bullets, trajectory, powder etc.)	10. Investigation into telephones of victim	11. DNA analysis of cigarette butt	Total
Team 1		X (5 last pub visitors)	X	X	X	X	X	X	X	X	X	X	11
Team 2	- ('too labor intensive')		X	X	X	X (inc. debit card transactions petrol stations nearby)	X	Yes (inc. social media)	X (incl. coins and De Bever's bike)	X	X	X	10
Team 3	-		X	X	X	X	X	Yes (inc. public transport)	X ('entire crime scene')	X	X	X	10
Team 4	X (wife and De Bever)		X	X	X	X	X	X	X	X	X	X	11
Team 5	X (wife and parents)		X	X	X	X	X	X (inc. police dog)	X	X	X	X	11

Team 6	-	X	X	X	X	X	X	X	X (inc. 3D scan )	X	X	10
Team 7	Yes / family and De Bever	X	X	X	X	X	X	X (inc. coins )	X	-	X	10
Team 8	Yes / wife and De Bever	X	X	X	X (inc. debit card transactions petrol stations nearby)	X	X (inc. police dog)	X (inc. curtains)	X	X	X	11
Team 9	X / wife	X	X	X	X	-	X	-	X	X	X	9
Team 10	X (last 3 regulars)	X	X	X	X	-	X	X (inc. coins )	X	X	-	9

*Table explanation: X = tool deployed | - = tool not deployed*

Table 4.4 shows little difference between the investigation tools deployed by the various teams. The Command Core Teams provided little justification for deployment of their chosen tools. It appeared as if the deployment of the tools was more a standard repertoire than a conscious choice. This suggestion is reinforced by the great similarity between the procedures the teams deployed. The choice for a particular investigation tool was substantiated in or two cases, however.

Most discussion took place in regard to telephone tapping and dactyloscopic investigation. A few teams considered telephone tapping too labor intensive to deploy without a clear hypothesis. In the first round, however, one team decided to deploy five telephone taps on the last three pub visitors, as well as on the two visitors who had mentioned those three. They reasoned as follows: 'A combination of interviews and tapping can be productive. Certainly nothing to lose'. In regard to dactyloscopic investigation, a few teams discussed its desirability. One team decided to use the 'British'



method, namely a full dactyloscopic investigation, including the glasses. A certain member of that team suggested that the curtains should also be included but this was met with, 'We need to be realistic'.

In addition, the teams were asked to deploy available officers from the Operations Core Team (including forensic investigators) and allocate them to the tasks on which they had decided. Table 4.5 shows the number of deployed Operations Core Team officers per task. Also evident is the diverse focus adopted by the different teams across the various tasks: some teams opted for relatively more investigation capacity on telephone tapping (10-15%), while other teams allocated more capacity to extensive neighborhood enquiries and (repeat) interviews.

**Table 4.5:** Deployed Operations Core Team officers per task per Major Investigation Team per round

Deployed Operations Core Team officers per activity per Major Investigation Team across all rounds													
	1. Telephone taps	2. Telephones of victim	3. Witness alibi check	4. Historiography	5. CCTV, telephone masts, and other volatile data.	6. Family detective	7. Neighborhood investigation	8. Dactyloscopic investigation	9. Investigation into shooting (bullet, trajectory, powder etc.)	10. Investigation into telephones of victim	11. DNA analysis cigarette butt	Total	
Team 1	3	1	4	1	2+1*	1	3	1	1	1	1	19	
Team 2	-	1	5	1*	2+1*	1	4	2	1	1	1	18	
Team 3	-	1	6	1*	1+1*	1	2	2	1	1	1	16	
Team 4	2	1	4	1+1*	1+1*	1	2	1	1	1	1	16	
Team 5	2	1	6	1	1	1	4	1	1	1	1	20	
Team 6	-	1	6	1*	1+1*	1	4	2	3	1	1	20	
Team 7	2	1	6	1*	1+1*	1	4	2	2	-	2	21	

Team 8	2	1	2	1*	1+1*	1	3	2	2	1	1	16
Team 9	1	1	4	1*	1*	-	2	-	2	1	1	12
Team 10	3	1	6	1*	1*	-	4	2	1	1	-	18
Total	15	10	49	3+8*	10+9*	8	32	15	15	9	10	176

*Table explanation: \*= execution of task by a Commander Core Team member with or without help from an Operations Core Team officer. The involvement of these Commander Core Team members in a certain task has not been taken into account in the total because this table shows only the deployment of Operations Core Team officers*

The Commander Core Team members also took on certain operational tasks such as arranging a financial investigation of the pub by the Finance Department, preparation of interviews, interview with De Bever, contact with the Criminal Intelligence Unit, following social media, information search in police systems, investigation into weapons in the neighborhood, document analysis, prioritization of forensic evidence, media policy, contact with force management and the Public Prosecution Service, preparation of timelines (who was in the pub and when), compiling the file, record keeping, coordination of family and community police officers, organization of neighborhood meetings for worried residents, coordination of staff and projects, contact with public prosecutor, etc.

*Focus during the investigation and the search for confirmatory evidence.* This aspect can be divided into four separate subjects: tunnel vision, focus, falsification/verification and elimination. Tunnel vision. None of the Command Core Teams members manifested evidence of tunnel vision during the game. The participants were generally quite alert to the danger of tunnel vision (as defined by the Criminal Investigation Reinforcement Programme).

**During the serious game such comments were made as...**

- 'I feel a tunnel coming on.'
- 'We need to take into account the possibility of alternative scenarios. It could also be an outsider - someone who doesn't appear in the scenario.'
- 'We have to investigate all the leads before drawing any conclusions.'
- 'You have to focus. Tunnel through.'

Focus. We identified the extent to which the Command Core Teams introduced focus during their investigation. By focus we mean the extent to which a team concentrated on a certain person in regard to whether or not he/she had committed the murder. The table below shows, per game round, the extent to which a Command Core Team concentrated on the seven people in the game (see Table 4.6).

**Table 4.6:** Investigation focus per round

Degree of focus per round							
	De Bever	Chorizo	Datema	Asylum seekers	Upstairs neighbor	Wife	Other pub regulars
Investigation focus in round 1							
Team 1	O	O	n/a	O	O	O	O
Team 2	O	O	n/a	O	M	O	O
Team 3	O	O	n/a	O	O	O	O
Team 4	O	O	n/a	O	M	P	O
Team 5	O	O	n/a	O	M	P	O
Team 6	O	O	n/a	O	V	V	O
Team 7	O	O	n/a	O	M	O	O
Team 8	O	O	n/a	O	V	O	O
Team 9	O	O	n/a	O	M	O	O
Team 10	O	O	n/a	O	M	M	O
Investigation focus in round 2							
Team 1	O	O	O	O	O	O	O
Team 2	V	O	M	F	O	O	O
Team 3	O	O	O	O	O	O	O
Team 4	P	O	M	P	M	O	O
Team 5	P	O	M	O	M	O	O
Team 6	V	O	M	O	O	O	O
Team 7	P	O	O	O	M	O	O
Team 8	P	O	M	O	O	P	O
Team 9	V	E	M	O	M	P	O
Team 10	O	O	M	O	O	O	O
Investigation focus in round 3							
Team 1	S	F	O	F	O	O	O
Team 2	V	O	O	F	O	O	O
Team 3	O	O	O	O	O	O	O
Team 4	S	O	O	V	M	O	O
Team 5	P	O	M	O	M	O	O
Team 6	V	O	O	O	O	O	O

Team 7	V	O	O	O	O	O	O
Team 8	V	O	O	O	O	V	O
Team 9	V	E	M	F	O	V	O
Team 10	O	O	M	O	O	O	O

*Table explanation: The following terms and abbreviations were used in the assessment of focus on persons: M (missed): person not (yet) noticed; O (open): person was noticed but not (yet) linked to scenario; P (priority): person subjected to intensive investigation (at least two different methods of investigation); F (falsification): person was linked to an innocent scenario; V (verification): person was linked to guilty scenario; E (elimination): person was explicitly eliminated; S (suspect): person was formally identified as a suspect (Public Prosecutor informed).*

Table 4.7 shows the degree of the investigation focus by the end of round 3.

**Table 4.7:** Degree of focus among Command Core Teams

Degree of focus (end of round 3)	Percentage persons (10 teams / 7 persons = 70 focus possibilities)
Missed	7%
Open	72%
Priority	1%
Linked to guilty scenario	12%
Linked to innocent scenario	6%
Eliminated	1%
Accused	3%

The tactics adopted by almost all the Command Core Teams were thus generally the same: first an initial orientation of all persons involved followed by careful focusing and formulation of a direction. The teams' focus did indeed remain open for a long time during the game (after the last round, 8 of the 10 teams still believed that 'any-one' could have done it).

At various moments during the investigation, the focus shifted to five of the seven (groups of) persons. The table below shows per person the percentage of focus they received as well as the nature of the information about them in the storyline (table 4.8).

**Table 4.8:** Focus percentage per person among all Command Core Teams

Person(s)	Focus share	Information
De Bever	44%	The most suspicious circumstances.
The wife	21%	Little information and confirmed alibi.
The asylum seekers	18%	Most of the political and media attention.
Chorizo	12%	Last to leave pub. Confirmed alibi.
Upstairs neighbor	6%	Little information. Had occasionally complained.

Falsification and verification. An important skill for Command Core Teams in order to strengthen the evidential value of scenarios and hypotheses, is to be able to deal effectively with counterevidence. In total, three Command Core Teams, across three rounds, attempted five times to find evidence for an innocent scenario. Four of the five cases involved the asylum seekers, and the fifth Chorizo. Seven Command Core Teams did not adopt this strategy and therefore did not formulate an innocent scenario. None of the teams attempted to refute a scenario or hypothesis. So the Command teams did indeed formulate innocent scenarios but none tried to prove that a particular scenario was untrue. None of the teams asked the question, for example, why De Bever could not have done it. They searched diligently only for confirmatory evidence to support the hypotheses and scenarios they had formulated. Elimination. The exonerating evidence which had been included in the scenario – the confirmed alibis of the victim’s family and Chorizo – was noticed by virtually all the Command Core Teams. Despite Chorizo’s confirmed alibi, only one Command Core Team reached the logical conclusion that he could not have done it. Nine teams continued to regard Chorizo as a possible suspect. In regard to the relatives’ confirmed alibi, not a single Command team decided to eliminate the relatives and they remained possible suspects.

*Information impulsion fallacy.* Information impulsion fallacy was evident in varying degrees in virtually all the Command Core Teams. We observed among many of the teams the reverse variation of information impulsion fallacy: the scenario contained little information about the ‘true’ perpetrator (Datema) and nor did the teams ask for information or assign investigators to the task. Consider, for example, the limited investigation capacity assigned to Datema. This mechanism was not explicitly acknowledged in any of the teams.

*Decision making under political and social pressure.* An element of political and social pressure was included in the game surrounding the involvement of three asylum

seekers (see scenario). This was an important issue to all the participating Command Core Teams who responded to the situation in a variety of ways.

- In some Command teams, the team leader decided to withhold information about the *political* pressure and to deal with it himself. In other teams the information was communicated but they were told specifically that it was not to play a part. In one or two teams the political pressure was regarded as a strategic argument not to lend investigating officers to another force.
- Many Command teams responded to the *social* pressure by deploying extra capacity on the asylum seekers so as to give priority to this line of investigation. Yet only 1 of the 10 teams had drawn up a scenario in which the asylum seekers could have done it. Three Command teams maintained an ‘innocent’ scenario in regard to the asylum seekers: they wanted to find evidence that the asylum seekers had not done it and thus offset the political and social pressure. A number of teams who assumed that someone known to the victim was the perpetrator, which implicitly exonerated the asylum seekers, continued to explicitly regard the asylum seekers as possible perpetrators.

### 3.3.2. INTERVIEWS

During group interviews, we asked about the effects of the Criminal Investigation Reinforcement Programme on the prevention of tunnel vision. During the interviews we paid special attention to the areas which, in the final assessment of the Programme, the police themselves said had contributed most to the ability to recognise tunnel vision: the MIT model, the devil’s advocate system and critical reflection, working with hypotheses and scenarios and an open culture.

#### *The MIT model*

The Command Core Teams were unanimous as to the suitability of the MIT model and subsequently improved police investigations (including less tunnel vision) given, in contrast to previously, the permanent positions, greater and more certain staffing capacity and fixed roles. The implicit assumption here appears to be the creation of a better and more open style of cooperation resulting in improved criminal investigations. One example given by several teams: permanent positions means that people learn to better interact with each other and recognise each other’s strengths and weaknesses.

*‘We have been working together as a team for a year. You make mistakes now and then but because we’re always working together you get to know*

*each other's strong and weak points. So you learn how to anticipate each other's strong and weak areas.'*

*'The strength of the MIT is that you know each other and you know what everyone is capable of. You know how to respond to each other. Working together used to be more difficult. It would take more time before you got to know how others worked. Now, it all goes so smoothly.'*

*'The advantage of the MIT model is that you have five people who keep each other on their toes. Everyone has their own task. You know what someone else does and what you can expect from them. Because we all have our own tasks, nothing gets forgotten. The level of professionalisation in the tasks has also improved because there is greater specialisation.'*

None of the teams, however, ventured to claim that the MIT structure had resulted in greater effectiveness. In other words, they did not think or did not know whether more cases were solved after implementation of the MIT model. It is, therefore, not possible to qualify objectively the positive assessment of the MIT model by the interviewed Command Core Teams. Some teams said that as a result of the MIT model, fewer errors were made but they were unable to substantiate this assumption.

In regard to the value of the permanent MIT role distribution, a large portion of the team said that the requirement of special qualifications for the roles was exaggerated because all of them were capable of fulfilling different roles (and according to them this also applied to their colleagues in the Operations Core Teams). They believed that permanent roles reduced effectiveness.

*'For example, the requirement that you now have to be qualified before you can conduct interrogations. Of course there are lesser mortals in the force who are not so good at it. But most of them are highly skilled interrogators and now they all have to go on a course. That takes up a lot of time and doesn't necessarily mean that interviews will go better than before. The investigators who aren't all that good probably won't improve very much. I recently had a qualified interrogator brought in for a suspect. And what happened? The interrogator had no knowledge of crime so didn't understand*

*anything the suspect said. Simply understanding interrogation techniques isn't enough to interrogate well.'*

#### *Devil's advocate and critical reflection*

In regard to the devil's advocate tool, none of the teams was able to provide an example in which a flaw was identified as a result of its application. Most of the team members felt positive, however, about the devil's advocate system. The argument they used to substantiate their opinion was that this tool provided them with: sound advice, areas for improvement (at procedure level) and confirmation of the direction in the investigation already being pursued.

*'Now, after one and a half years, the devil's advocate system is starting to work. It took some getting used to. Now we get useful responses from the devil's advocate. The role of devil's advocate takes practice too.'*

*'A devil's advocate perspective is drummed into us from the outset of an MIT. When we start an MIT we have to present a plan of approach to the regional steering group. They immediately present us with a devil's advocate perspective. There's also a specially-appointed person in the force who we can always call on for a devil's advocate perspective. This is someone from inside the force with a master's degree in criminal investigation, trained to adopt the devil's advocate role. This person comes by now and again, requests documents and lets you know where your blind spots are. Many of them are not 'real' devil's advocates in that they help you guard against tunnel vision, but they mainly try to help you during the process.'*

A few Command Core Team members, however, did specifically mention various practical problems in regard to the devil's advocate system. The main drawback was the difficulty for the person who took the role of devil's advocate to gain adequate insight into all the team's information. In most police forces, the devil's advocate was allocated too little time. Some team members suggested therefore that a devil's advocate perspective should be sought 'within' the team, rather than outside.

*'Conducting a devil's advocate system is a time-consuming tool. I would like us to move toward a culture and structure of 20 devil's advocates in a team. Then a single devil's advocate would not be necessary. Everyone in the team should be able to take on the role of devil's advocate.'*



#### *Working with hypotheses and scenarios*

All the Command Core Teams indicated that they used hypotheses and scenarios during investigations. All the teams confirmed that, in general, the use of hypotheses and scenarios in combination with its associated 'administration' helped in decision making and was usually 'a pleasant way to work'. Some team members remarked, however, that the use of hypotheses and scenarios also had a negative rollout. They mentioned a development in which they found themselves having to spend more time and effort invalidating unlikely scenarios which they believed essential to successful prosecution: lawyers were asking increasingly, and more and more successfully, whether such scenarios had been adequately investigated. A shift was therefore emerging from identifying *positive* evidence in relation to a suspect, to finding *negative* evidence indicating other possible suspects or scenarios.

#### *Open culture*

During the interviews, most teams spontaneously mentioned that compared with ten years previously, the culture within investigation teams had become more open. This new culture was said to be most evident during 'open' brainstorm sessions which were organised these days, as well as joint briefings together with the Operations Core Teams. A minority of the teams questioned did not feel that the culture was more open, however. They felt that the most significant difference was that decisions and associated arguments were now recorded in a better manner, and believed that this development encouraged reflection on decision making within the teams.

*'It isn't that we suddenly now make more 'open' decisions because of the MIT model. We already did that. Now we have to record decisions we make as well as the reason why. You have to record what you do, and what you don't do and why not. So you have to think much more about how you have reached a particular decision, and that's a good thing.'*

In addition to the four principal measures set out in the Criminal Investigation Reinforcement Programme which according to the regional force leaders contributed most to the prevention of tunnel vision, the Command Core Teams described a further, in their view, important issue. All the teams indicated that the focus on tunnel vision within society and within the police force had contributed to a high level of awareness within the field of criminal investigations. One teamleader described tunnel vision as having a high TOMA (top-of-mind awareness). Another team member said pointedly that he 'didn't want to be the next bungler to fall into the trap of

tunnel vision'. Other members described a 'collective fear' of tunnel vision on the work floor. Some team members referred to the emergence of tunnel vision as unprofessional and a sign of weakness. Most of the teams said there was no question of internal hierarchical encouragement aimed at the prevention of tunnel vision nor much focus on the issue during training blocks (of which many team members said they could not attend as a result of staff shortages).

#### **4.4. REFLECTION ON FADCM ASPECTS**

##### **4.4.1. FACTFINDING**

The investigation shows a reverse variation of the information impulsion fallacy. It seems that CCT members tend to pay little attention to individuals that are related to the crime scene about which little is known. That is not to say that this is irrational or an indication of flawed decision making. In practice, it could be the case that individuals that have nothing to do with a crime are unlikely to pop-up in the investigation process. It is likely that frontline workers provide their commanders with information about individuals with a high chance of involvement in the crime. However, this finding suggests that frontline commanders could not be expected that in exceptional cases, they are able to find the subject over which little information is provided.

##### **4.4.2. ANALYSIS**

The results of the investigation indicate that the stereotypes play a part during the interpretation of information. In addition, no effort was devoted by the CCTs to refute a scenario or hypothesis. The CCTs did formulate innocent scenarios but none tried to prove that a particular scenario was untrue. NDM theories suggest that experienced individuals make decisions that are appropriate (not optimal) in the majority of cases. The usage of stereotypes in the decision making process as well as the way CCTs deal with hypotheses and scenarios may be appropriate in the majority of criminal investigations. However, in an exceptional case the way hypotheses and scenarios are used in daily practice may result in errors in the investigation process. Of course, more attention could be devoted to the usage of hypotheses and scenarios in the investigation procedure. However, it should be taken into account that proving all innocent scenarios may take considerable time which cannot be given to other criminal cases.

Notably, the content of the hypotheses and the scenarios differed considerably among the MITs. Some scenarios were used by almost all the teams whereas other scenarios and hypotheses were used only by a few teams. Some rules of thumb con-

tradicted one another. Particularly it seems that rules of thumb differed between regional police force. Consequently, as has been argued before (e.g. Zsombok & Klein, 1997; Kahneman & Klein, 2009), it seems that the environment in which decision makers operate heavily determines the rules of thumb they use.

#### 4.4.3. DECISION MAKING

The game revealed that all the Command Core Teams appeared highly alert to the danger of tunnel vision. In fact, symptoms of reverse tunnel vision became evident: the teams created so little focus during the investigation, that even until the end of the game they continued to invest time and resources in investigating far less likely hypotheses and scenarios. In fact, symptoms of reverse tunnel vision became evident: the teams created so little focus during the investigation, that even until the end of the game they continued to invest time and resources in investigating far less likely hypotheses and scenarios. When we reviewed the game with the teams, the lack of focus appeared not to have been a result of training or experience but, in the light of the general furor surrounding tunnel vision, more a collective fear ('this won't happen to me') of failing to identify a potential perpetrator or scenario. As also argued by others, this lack of focus could well be a far greater phenomenon and problem within criminal investigations than the risk of tunnel vision (cf. Snook & Cullen, 2008). Although the prevention of errors in major criminal investigation is important, there is also a need for efficient investigation work as a lot of crimes remain unsolved. Both are vital for the legitimacy of the criminal justice system.

In addition, the investigation suggests that CCTs unconsciously make use of process-related rules of thumb. Generally the CCTs decided to make use of all research tools and instruments they had available. However, it was unclear why certain methods and instruments would be effective and efficient in particular cases. Cost-benefit considerations appear to play no significance in the decision making process.

### 4.5. METHODOLOGICAL REFLECTION

#### 4.5.1. METHODOLOGICAL ASSESSMENT OF RESEARCH FINDINGS

**Table 4.9:** Methodological assessment

<b>External reliability</b>	The external reliability of the findings seems to be good. The serious game was played in the own environment of 10 CCTs and it appeared to be transferable from one
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	environment to another, even when some CCTs had their own specific procedures.
<b>Internal reliability</b>	The decisions, hypotheses and scenario's written down by the CCTs after each round were discussed with two other researchers who were also present when playing the game. Generally this yielded similar interpretations about the working of different NDM mechanisms that were incorporated into the game.
<b>Measurement validity</b>	-
<b>Internal validity</b>	-
<b>External validity</b>	Since only 10 CCTs (of the approximately 50 in the Netherlands) are investigated and the participating CCTs were not randomly selected, the results cannot be generalized to the entire organization of major criminal investigation in the Netherlands.
<b>Ecological validity</b>	Generally, a serious game inevitably compromises the complex reality in which investigation teams operate. Although a serious game is intended to mirror reality as closely as possible, in practice not all information is of course summarized and written down for Command Core Teams and certain requested information will sometimes be made available very quickly or not at all. The level of realism (the extent to which the methods, materials and setting in the study correspond to real life) of the serious game remains in that sense limited, but much higher than other research methods which are carried out in laboratory conditions. More specifically, questions can be raised about the ecological validity of the result that no indications of tunnel vision were found. It should be noted that the degree of tunnel vision was measured throughout a timespan of two hours, while criminal investigations in real life can last weeks to several months. The emergency of tunnel vision seems to become greater as time goes by.
<b>Triangulation</b>	Triangulation of the different research methods mainly generates convergence. In the literature there is evi-

	<p>dence that criminal major investigation is susceptible to decision making biases which is supported by the findings from the serious game. The interviews were used to check the results the serious game. Both did not provide indications of a high level of tunnel vision in major criminal investigation.</p>
<b>Opinion of participants</b>	<p>Based on interviews after the serious game, it can be concluded that the CCTs of the semi-urban and rural police forces were much more positive about the quality of the serious game and its potential as a training tool. These teams considered the game to be realistic. On the contrary, the CCTs of the larger cities were less positive about the game. These teams felt that they had enough experience. Generally, the CCTs of larger cities supported the view that training-on-the-job should be intensified in major criminal investigation, but especially for less experienced CCTs in semi-urban and rural police forces. The CCTs of larger cities primarily identified aspects in the game that they felt were different in daily practice.</p>

#### 4.5.1. COMMENTS ON THE APPROPRIATENESS OF THE RESEARCH METHODS USED

Not all potential decision-making pitfalls could be studied in the serious game as was developed in this investigation. For instance, it was not possible to distinguish clearly between decision making on the basis of stereotypes and contextual rules of thumb. The lesson is that only a few NDM mechanisms can be studied in this type of serious game. However, by using a compact, non-tech serious game as in the investigation, it was possible to identify well known decision making biases and even a new one (reverse version of the information impulsion fallacy). A major advantage of the serious game was that it could be played in the trusted environment of the police station. Participants were very involved in the game and seemed to like it. Furthermore, a well developed serious game could be used both for training as research purposes. As the majority of participants regarded the serious game as a high potential training tool, there seems to be room for more investigations using a serious game for research and training purposes.

## Chapter 5. Ethical leadership of battalion chiefs

### 5.1. INTRODUCTION TO THE STUDY<sup>5</sup>

This chapter applies the ethical leadership theory on battalion chiefs of the fire service. It examines the extent to which battalion chiefs can minimize organizational misbehavior by frontline workers by exploiting ethical leadership behavior. In addition, it examines the extent to which prototypicality mediates the relationship between ethical leadership and organizational misbehavior. Prototypical leaders possess characteristics that are typical of the group and which are shared by members of the group and thus reflect the group prototype. The study is primarily concerned with the FADCM aspect 'communication'. Data were gathered by conducting a survey among crew commanders and interviews with battalion chiefs.

### 5.2. MOTIVATION FOR STUDYING ETHICAL LEADERSHIP

In every organization there is some degree of organizational misbehavior. Organizational misbehavior can be defined as '*any intentional action by members of organizations that violates core organizational and/or societal norms*' and can be divided into instrumental processes (i.e. misbehavior motivated by self-interest consideration) and normative processes (i.e. misbehavior due to identification with and devotion to what is seen as the organization) (Vardi & Wiener, 1996: 151). Fire services are often considered in the literature as one of the few organizations which (can) operate successfully in a hierarchical command and control system, especially in emergency situations (e.g. Buck et al. 2006), as it is commonly suggested that fire services have a strong culture which puts an emphasis on ranks, respect for authority, and command functions. It could therefore be expected that the degree of organizational misbehavior of fire service personnel during emergency situations is low. However, based on interviews with 9 battalion chiefs of the Amsterdam-Amstelland fire service, the opposite was concluded. Consider for instance the following examples derived from narratives

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<sup>5</sup> This chapter is based on: Groenendaal, J. De Wolde, A. Helsloot, I. (2015). Ethisch leiderschap: beperkt het averechts werkgedrag? *Management en Organisatie*. (in print); and: De Wolde, A. Groenendaal, J. Helsloot, I. Schmidt, A. (2013). An explorative study on the connection between ethical leadership, prototypicality and organizational misbehaviour in a Dutch fire service. *International Journal of Leadership Studies*. 8 (2), 18-43.

of battalion chiefs:

**Some narratives from battalion chiefs**

On Thursday afternoon June 26<sup>th</sup> 2009, during a large fire at an Amsterdam business park, four stores were destroyed. The fire broke out in furniture store and then spread to a TNT Post building next door. A total of 58 people were treated for smoke inhalation. During the fire, firefighters of the Amsterdam-Amstelland fire service entered the building against the explicit order of the battalion chief (the officer in charge on the fire ground operations). Other examples of orders not being followed are: a fire in a structural building at the Herengracht (January 1<sup>st</sup>, 2008), a structural fire in a suburb of Amsterdam (October, 28<sup>th</sup>, 2008) and a fire at City box (November, 26<sup>th</sup>, 2009). As an example with a serious effect: on Thursday night July 17<sup>th</sup> 2008, a school in Amsterdam burned completely to the ground. The battalion chief's order not to enter the building was not followed. Consequently, a firefighter had to be rescued by his own colleague.

There are more cases of organizational misbehavior in the Amsterdam-Amstelland fire service, such as neglecting the procedure to 'scale up' a fire so a battalion chief will not be notified (his function being to coordinate the fire suppression by multiple fire engines. An sometimes heard practice in the fire service in this context is reporting to the central dispatch centre: *'There is a small fire on the first floor, there is a small on the second floor and a small fire on the third floor'* When firemen are addressed about these issues, often heard reactions are: *'I did not understand the command'* or *'the command is not been communicated correctly'*. Interestingly firemen indicate that their compliance depends on which fire officer they are dealing with.

These narratives of organizational misbehavior in the Amsterdam-Amstelland fire service raised the question as to how organizational misbehavior conducted by front-line workers could be minimized. Much scholarly attention has been devoted to the forces that drive organizational members to engage in organizational misbehavior (Vardi & Wiener, 1996). However, the empirical knowledge about how to overcome organizational misbehavior seemed to be limited (Brown et al. 2005; Brown & Trevino, 2006). Ethical leadership is proposed to have direct positive effects on ethically appropriate conduct of organizational members and hence is supposed to be negatively associated with organizational misbehavior (Brown et al. 2005; Trevino et al.

2000; 2003; De Hoogh & Den Hartog, 2008; 2009; Kalshoven & Den Hartog, 2009). This led to the decision to start an investigation to the relation between ethical leadership and organizational misbehavior. In the interviews, the battalion chiefs suggested that being seen by frontline workers as ‘one of the guys’ enforced their ability to limit organizational misbehavior. Consequently, some of the respondents engaged in social activities with the crew (for example: practicing sports together, frequently visiting fire stations and completing training activities as a group). Therefore it was decided to examine the role of prototypicality as mediating variable. In the next sections, these concepts will be further explained.

### **5.3. THEORY**

#### **5.3.1. ETHICAL LEADERSHIP AND ITS THREE COMPONENTS**

Ethical leadership is defined by Brown, Treviño and Harrison (2005: 120) as *‘the demonstration of normatively appropriate conduct through personal actions and interpersonal relationships, and the promotion of such conduct to followers through reinforcement, two-way communication, and decision-making’*. In the literature on ethical leadership, a distinction is made between being a moral person and a moral manager (e.g. Treviño et al. 2000). Being a moral person is a substantive basis of ethical leadership and implies that people think of you as having certain traits (e.g. being trustworthy, honest, etc.), engaging in certain kind of behavior and making decisions guided by ethical principles (Treviño et al. 2000). Being a moral manager is about drawing attention to ethical norms and values in the organization and attempting to foster followers’ moral behavior by setting standards and expectation for moral conduct (Van den Akker et al. 2009). As we are interested in ways to minimize organizational misbehavior, we focus in this chapter on moral management. Being a moral manager encompasses three key components: role modeling through visible action, the use of rewards and discipline, and communicating about ethics and values (Treviño et al. 2000: 131; Van den Akker et al. 2009). We refer to these as the components of ethical leadership or moral management.

#### *Role modeling through visible action*

Moral managers actively demonstrate normatively appropriate behavior, and are consequently seen as legitimate and credible role models (Brown et al. 2005; Brown & Treviño, 2006). Role-modeling behavior is supported by the ‘social learning theory’. The social learning theory suggests that individuals learn to pay attention to the attitude, behavior and values of believable role models, as well as, to reproduce these



types of behavior (Brown & Treviño, 2006: 598; Brown et al. 2005: 119; Weaver et al. 2005: 314). Based on this theory Brown & Treviño (2006: 597) suggest that most individuals need others for ethical guidance. Their argument is similar to Weaver et al (2005: 314), who argue that employees are strongly influenced by those individuals who are closest to them. Employees who work for an ethical leader are most inclined to imitate the behavior of their leader by showing ethical behavior themselves (Kaptein et al. 2005; Treviño et al. 2000: 136; Treviño et al. 2003: 6).

#### *Use of rewards and discipline*

Moral managers use a system of rewards (involving rewards and punishments) to hold followers accountable for ethical behavior (Treviño et al. 2000, 2003; Lasthuizen, 2008). Ethical leaders set the standards for ethical behavior and control their adherence (Treviño et al. 2003: 18; Weaver et al. 2005: 328). This mechanism is based on the reinforcement theory by Skinner (1953) and entails that people act, because they anticipate to certain consequences. According to the reinforcement theory followers keep track of the people who get punished and the people who get rewarded in an organization (Arvey & Jones, 1985; Kanfer, 1990). That is why moral behavior should be publically rewarded. Otherwise followers do not know that ethical norms should be adhered to. Of course, this functions the other way around as well. When immoral behavior is left unpunished, followers will assume such behavior is tolerated (Weaver et al. 2005: 328).

#### *Communication about ethics and values*

Moral managers should be unambiguous in their communication about ethics and values. Clear and frequent communication about ethics and values is therefore recommended, as well as relating ethics to ordinary business processes and being as open as possible about these processes (Treviño et al. 2000; Brown et al. 2005; Treviño et al. 2003; Van den Akker et al. 2009). Moral managers should not only focus on articulating ethics, but should be able to 'receive' information as well. Employees must feel safe to discuss ethical dilemmas and other problems they encounter in the workplace (Lasthuizen, 2008; Weaver et al. 2005). Employees should, for example, be stimulated by management to report bad news, without being reprimanded.

Following the preceding paragraphs, it can be concluded that a moral manager is a role model, hands out rewards and punishment for good and bad behavior and communicates effectively about ethics and norms. In this study, we include the one-dimensional ethical leadership measure developed by Brown et al. (2005) as well as

the three ethical leader components as measured by Treviño et al. (2000: 131) and Van den Akker et al. (2009). Thus, we measure role modeling, use of rewards and discipline, and communication about ethics and values (which, when taken together, could also be regarded as an ethical leadership scale) *in addition* to the one-dimensional ethical leadership scale, since we would like to know the extent to which the different components are related to organizational misbehavior and hence what component of ethical leadership matters most.

#### 5.3.2. ORGANIZATIONAL MISBEHAVIOR AND ETHICAL LEADERSHIP

Organizational misbehavior consists of acts which hurt an organization and its stakeholders (i.e. customers, colleagues, suppliers and managers) or diverge from the norms and values which are stipulated by an organization or society in general. This behavior can be visible, such as aggression or theft, but can also be more difficult to distinguish, such as not following specific instructions or doing work incorrectly. Organizational misbehavior can consequently be divided in passive and active organizational misbehavior and can be directed towards an organization, as well as individual colleagues (Semmer et al. 2010, Berry et al. 2007; Robinson & Bennet, 1995; Robinson & Bennet, 2000). Examples are, respectively, gossiping about colleagues and taking long breaks from work (Dalal, 2005). Jones (2009) notes that organizational misbehavior can also be exclusively directed towards management.

Much of the research on organizational misbehavior is centered on finding the cause of organizational misbehavior, without addressing the question as to how it can be reduced. Also there has been little research on the relationship between ethical leadership and organizational misbehavior. We discuss a few exceptions. Detert et al. (2007) found no significant relationship between ethical leadership and unethical behavior. Other research shows (e.g. Brown et al. 2005; De Hoogh & Den Hartog, 2009; Mayer et al. 2009) that ethical leadership has a positive relationship with positive work behavior. This implies that ethical leadership stimulates positive work behavior and that ethical leadership reduces organizational misbehavior. This is confirmed by Mayer et al. (2009). Their study suggests that ethical leadership is associated with a reduction of organizational misbehavior and a stimulation of positive behavior. Other research suggests that fair treatment of employees (Greenberg, 1990) and social charismatic leadership (Brown et al. 2006a) decreases organizational misbehavior. In accordance with the literature, we therefore put forward the following hypothesis:

*H 1a: Ethical leadership has an overall negative relationship with organizational misbehavior.*

It can be deduced from the social learning theory that independent leadership traits, such as being a role model, having a system of rewards and punishment and communication about ethics and norms, influences organizational misbehavior. Employees identify themselves with ethical leaders, and even admire them, and try to reach the same level of ethical behavior (Brown & Treviño, 2006: 607; Weaver et al. 2005: 314). It can also be deduced that rewards and punishment are one of the ways in which employees learn what acceptable behavior is (Bandura, 1977, 1986). Moreover this can be learned by witnessing ethical behavior or by hearing what possible consequences of (un)ethical behavior are. It can be argued from Skinner's reinforcement theory (Skinner, 1953) that employees exhibit more ethical behavior and less organizational misbehavior when ethical behavior is rewarded and unethical behavior is punished. Recent research by Jones (2009) suggests that organizational misbehavior can be reduced when managers treat their employees with respect and dignity and explain why certain decisions were made. The corresponding aspect is communication on ethical leadership about ethics and norms. The literature leads us hence to the following hypotheses:

*H 1b, 1c, 1d: The ethical leadership components role modeling through visible action (1b), the use of rewards and discipline (1c) and communication about ethics and values (1d) have a negative relationship with organizational misbehavior.*

### 5.3.3. PROTOTYPICALITY AND ETHICAL LEADERSHIP

The prototype is used in expressing identity information and describes and prescribes what appropriate behavior is applicable for group membership in a certain context (Giessner & Van Knippenberg, 2008). The prototype reflects the social identity and is a reference point for people who identify with a specific group. Prototypical group members show preferred behavior. Prototypicality can be understood from social identity theory (Tajfel & Turner, 1986). According to this theory the identity of a person is dichotomous. One part is shaped by a personal identity, which means that people have a free will. The other part consists of the social identity of an individual which comes from the knowledge that people are part of social groups and is shaped by the values and emotions which are part of this group membership (Syroit et al. 2005). The more people identify themselves with a specific group (i.e. describe themselves in

terms of a group identity), the more group membership shapes attitudes, conviction and behavior.

Kalshoven & Den Hartog (2009) are, as far as we know, the only scholars who studied the relationship between ethical leadership and prototypicality. Their research shows that prototypicality influences the relationship between ethical leadership and the perceived effectiveness of a leader indirectly. Ethical leaders are shown to be the ideal representatives of a group. This seems to suggest that ethical leaders are seen as more group prototypical. The following hypothesis can be derived from the work of Kalshoven & Den Hartog (2009):

*H 2a: Overall ethical leadership has a positive relationship with prototypicality.*

As mentioned before, we not only look at overall leadership, but at the three components of moral managers as well. According to Hogg (2001; see also Kalshoven & Den Hartog, 2009), prototypical leaders exemplify and amplify normative behavior. This relates closely to role modeling through visible action, using rewards and discipline and communicating about ethics and values. Based on this, we could formulate the following hypotheses:

*H 2b, 2c, 2d: The ethical leadership components role modeling through visible action (2b), the use of rewards and discipline (2c) communication about ethics and values (2d) are positively related to prototypicality.*

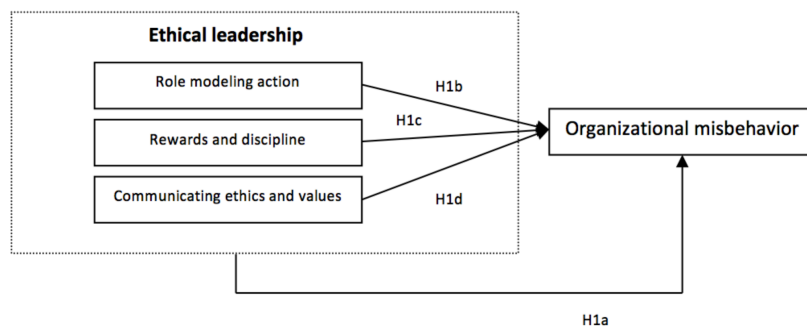
#### 5.3.4. ETHICAL LEADERSHIP, PROTOTYPICALITY AND ORGANIZATIONAL MISBEHAVIOR

Ethical leadership is associated with a decrease in organizational misbehavior, because employees identify themselves with ethical leaders, admire ethical leaders, try to reach the same level of ethical behavior and see an ethical leader as a role model for ethical behavior (Brown & Treviño 2006: 607; Weaver et al. 2005: 314). Prototypicality is also partly associated with a decrease in organizational misbehavior, because prototypical leaders can influence the behavior of subordinates and employees identify themselves with the prototype, just like in ethical leadership.

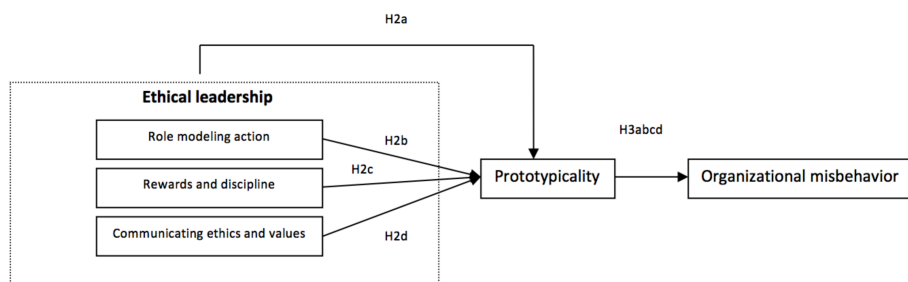
The more a leader corresponds with a prototype, the more he or she represents group standards, norms and values (Hogg, 2001). Consequently, a prototypical leader is more effective in mobilizing and influencing followers than leaders who are not seen as prototypical (Hains et al. 1997; Hogg et al. 1998; Van Knippenberg et al. 1994).

This implies that prototypical leaders can influence organizational misbehavior of group members in a positive and negative manner. The expectation is therefore that overall ethical leadership and the ethical leadership components, as viewed by followers, influence organizational misbehavior. The literature suggests partial mediation, as it is stated that besides prototypicality other mechanisms also influence the relationship between ethical leadership and organizational misbehavior (for instance: the personal relationship between leader and follower outside the work environment, the degree to which crew commanders and battalion chiefs have interacted, etc. (cf. Van Kalshoven & Den Hartog, 2009)). Based on prior research, we can formulate the following hypotheses:

*H 3a, 3b, 3c, 3d: Prototypicality has a partial mediating influence on the relationship between ethical leadership (3a) and the ethical leadership components (role modeling through visible action (3b), the use of rewards and discipline (3c) and communication about ethics and values (3d) and organizational misbehavior.*



**Figure 5.1: Conceptual model 1a**



**Figure 5.2: Conceptual model 1b**

## 5.4. METHODOLOGY

### 5.4.1. PARTICIPANTS

As Brown (2007: 142) suggests, ethical leadership can best be understood by studying those people who are being led. We therefore asked all 97 professional crew commanders of the Amsterdam-Amstelland Fire Service to fill out a questionnaire. Crew commanders work irregular 24 hour shifts and can be hard to get a hold of (because they cannot leave their station). To get the response rate as high as possible, the questionnaires were distributed during crew commander 'theme meetings' held each year in May and October. During these meetings our research goal was presented and afterwards the questionnaires were handed out. A total of 61 crew commanders filled out the complete questionnaire (a 63% response rate). The crew commanders had to fill out the questionnaire immediately, since we knew from prior experience in fire services that crew commanders are hard to motivate to participate in survey research.

The questionnaire consists of 43 questions and has been tested beforehand (see below). When filling out the questionnaire the crew commanders were asked to keep the last battalion chief they've worked with (during an incident) in mind.

### 5.4.2. SCALE

We have measured *ethical leadership* by using Brown's et al. Ethical Leadership Scale (ELS) (2005: 125). The ELS consists of ten items which are ranked on a 7 point Likert Scale, where 1 stands for 'Strongly Disagree' and 7 for 'Strongly Agree'. By comparing the results of the crew commanders an ethical leadership average of the battalion chiefs was calculated.

The questionnaire was pre-tested in order to know whether the questionnaire was understandable for the participants. The result of the pre-test was that certain items were not apparent to the respondents. On every question 'leader' has therefore been changed in battalion chief. For example in: 'The battalion chief listens to what employees have to say'. All questions have been revised according to this setup. In addition it was not understood what was meant by 'the battalion chief sets an example of how to do things the right way in terms of ethics'. To clarify we added an example, and revised it as follows: 'the battalion chief sets an example of how to do things the right way in terms of ethics, for example by abiding to the safety rule strictly'. Also 'ethical' in the item 'conducts his/her personal life in an ethical manner' has been

explained, following the theory, by using sincerity, reasonability and caring as examples. 'Ethical standards' in the item 'disciplines employees who violate ethical standards' are explained by giving examples of security protocols, the correct usage of material or the limits of the response area. In the item 'discusses business ethics or values with employees' examples are provided of business ethics and values, such as the fact that the cars of the fire service may not be used for personal reasons or beards are not allowed. At the request of the Amsterdam Amstelland Fire Service three items were added: (1) The battalion chief can change/withdraw orders based on the arguments of his/her co-workers; (2) The battalion chief defines success as a collaborative act, and (3) The battalion chief can be both critical and vulnerable.

The internal consistency between the 13 items was very high ( $\alpha$  .924). Therefore, all 13 items are taken together into the overall ethical leadership scale.

*Role-modeling behavior, the use of rewards and discipline and the communication about ethics and values* are measured by using Van den Akker's et al (2009) scale. Van den Akker et al measure the moral manager aspect (see Trevino et al. 2000) based on six statements and three answer categories. Each of the theses corresponds to an ethical leadership element. The respondents assign priority to the ethical behavior they would like to see and fill out the behavior they actually see. In our study we ask what the observed ethical behavior is. The six statements are not measured according to a Likert Scale, as are the other questions. The variables are nominal and cannot be used in a regression analysis with the other variables. To make this possible each statement is transformed in a dichotomous variable, which means that we have made two answer categories out of initial three. In Van den Akker's et al. (2009) questions the word 'moral' is used. In our pre-test it was found that the content of 'moral' was not clear to the respondents. Because of this in our questionnaire 'moral' and 'ethical' are, in accordance with Brown et al. (2005), translated in 'sincere', 'reasonable' and 'caring'.

*Prototypicality* is measured by using the Van Knippenberg and Van Knippenberg (2005) scale. The answer scale is a five-point Likert-scale in which 1 corresponds to 'disagree' and 5 to 'agree'. In our pre-test it came up that the word 'group values' in the questions on prototypicality was not clear either. This item has been changed in 'the Battalion Chief embodies our group values. This means that he acts in a way me and my group finds appropriate'. The internal consistency between the items was

very high ( $\alpha .925$ ). Therefore, all 6 items are taken together into the overall scale prototypicality.

*Organizational misbehavior* is measured best by observing it in real life, for instance by the use of a helmet mounted camera. In this study organizational misbehavior is measured by asking questions to employees (hence employee self-report), which is an accepted and widely used method in literature for measuring organizational misbehavior (e.g., Aquino et al. 1999; Fox et al. 2001; Robinson & Bennett, 2000; Fox & Spector, 1999). Organizational misbehavior is measured by using the Organizational Deviance Scale by Robinson & Bennet (1995; 2000). As we were interested in a specific form of organizational misbehavior, i.e. disobedience in operational settings, we added five items: (1) Do you start negative rumors on the Amsterdam-Amstelland Fire Service? (2) Have you ever endangered yourself or colleagues by not following order from the Battalion Chief? (3) How many times have you entered a burning building against the orders of a Battalion Chief? (4) How many times did have you acted as if you haven't heard an order from the Battalion Chief? (5) How many times did you present a fire smaller than it actually was, so a Battalion Chief was not called for? Answers can be provided according to a seven-point Likert-scale, where 1 corresponds to 'never' and 7 to 'always'. In our questions 'boss' is replaced by Battalion Chief, and organization has been supplemented with Amsterdam Amstelland Fire Service. Also 'at the site of an incident' is added, for example, to the item 'employee talking with co-worker instead of working'.

The internal consistency between the items was acceptable ( $\alpha .7654$ ). Therefore, all 16 items are taken together into the overall scale organizational misbehavior.

At the request of the Amsterdam-Amstelland Fire Service two questions were added to the questionnaire: (1) Are you reprimanded by a Battalion Chief when you scaled up an incident not according to the rules?; (2) Do you think it's a good idea for Battalion Chiefs to reprimand Crew Commanders when rules are broken?

## **5.5. RESULTS**

### **5.5.1. DESCRIPTIVE RESULTS**

As already noted, 61 of the 97 Crew Commanders filled out the questionnaire, a response rate of 63%. All of the respondents were male. At the moment there were no female Crew Commanders working at the Amsterdam-Amstelland Fire Service. On



average the respondents have worked for the fire service for 26.5 years (starting as firefighter, 'climbing through the ranks' to crew commander) and have a MBO (vocational) education.

The average, the mode and the standard deviation of the variables 'ethical leadership', 'prototypicality' and 'organizational misbehavior' are presented in the table below.

**Table 5.1:** Descriptive statistics

	<i>M</i>	Mode	<i>SD</i>	1	2
Ethical leadership	4.80	4.08	1.00		
Prototypicality	2.82	2.00	.86	,790**	
Organizational misbehavior	1.91	1,40	.64	-,385**	-,390**

*Note:* \*\*  $p < .01$

The results stated in the table demonstrate that battalion chiefs, in the perception of the crew commanders, show a low level of ethical leadership and are generally not regarded as group prototypes. According to their self-reports, crew commanders rarely engage in organizational misbehavior, although respondents to some extent admit to disobeying orders from battalion chiefs.

#### 5.5.2. ROLE MODEL BEHAVIOR

On the first statement, 'My Battalion Chief displays ethical consistency in that...', 53.4% of our respondents (n=58) answered that their Battalion Chief at least 'talks the walk', 24.1% said their Battalion Chief 'walks the talk' and 22.4% says that their Battalion Chief 'always walks the talk and talks the walk'. On the second statement, 'My Battalion Chief routinely demonstrates his/her moral values to me', 56.6% of the respondents (n=46) said that this is only the case in professional situations, 34.8% said that this happens in both private and professional situations, and 8.6% said this only the case in private situations. It should be noted that most Crew Commanders acknowledged to not having seen their Battalion Chief in private situations.

#### 5.5.3. SYSTEM OF REWARD AND PUNISHMENT

On the first statement, 'My manager secures the ethical behavior of employees by emphasizing...', 45.1% of our respondents (n=51) said that their Battalion Chief punishes deviance from organizational values, principles and standards, 15.7% said their Battalion Chief rewards conformity to organizational values, principles and standards

and 39.2% said their Battalion Chief rewards conformity and punishes deviance. On the second statement, 'My manager is exemplary in defining success in that he or she...', 49.1 % of the respondents (n=53) said that their Battalion Chief defines success not only by results, but in also in the way these were achieved, 28.3% said that their Battalion Chief defines success by results, but does not allow unethical or illegal conduct in obtaining them and 22.6% of the respondents said their Battalion Chief defines success by results, regardless of how these are achieved.

#### 5.5.4. COMMUNICATION ON ETHICS AND NORMS

On the first statement, 'My Battalion Chief transmits organizational values, principles and standards to me...', 51.9% of the respondents (n=54) said that his happened in a spirit of commitment through coaching, 40.7% said this happened in a spirit of compliance, by telling the way it should be done and 7.4 said that his happened in a spirit of self governance, through intense dialogue. On the second statement, 'My Battalion Chief would consider me most exemplary if I was willing to...' 52.8% (m=53) said they needed to report unethical behavior to him or her when I experience it in my work environment, 41.5% said they needed to stand up to their Battalion Chief when they sensed he or she is displaying or allowing unethical behavior and 5.7% said they needed to close their eyes and shut their ears to unethical behavior he or she is experiencing in the work place.

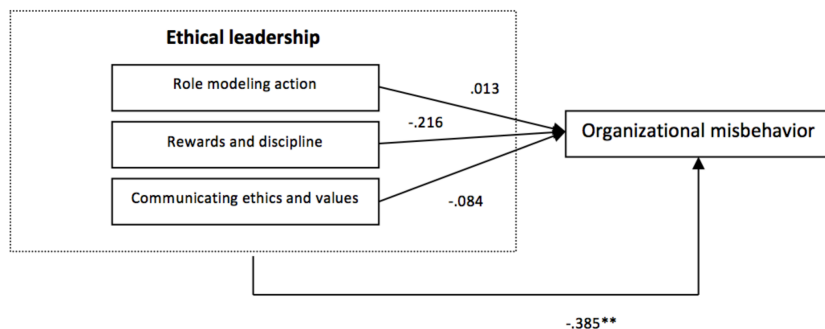
#### 5.5.5. ADDITIONAL QUESTIONS

On the question 'Are you reprimanded by a battalion chief when you scaled up an incident not according to the rules?', 52.7% (n=55) answered that this almost never happened. 47.3% of the crew commanders (n=55) answered that they sometimes or often are reprimanded when they scaled up not according to the rules. Though most crew commanders are not reprimanded by battalion chiefs when they scale up not according to the rules, 90.9% agrees that crew commanders should be reprimanded when rules are broken. 9.1% thinks that reprimanding crew commanders is bad.

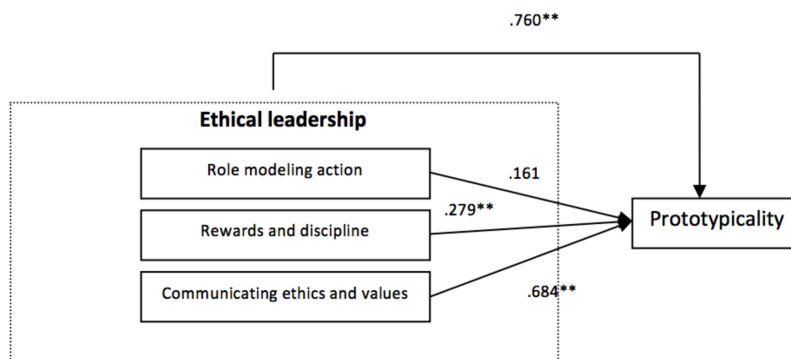
#### 5.5.6. REGRESSION ANALYSIS

A number of regression analyses have been performed to review to extent to which prototypicality mediates the relationship between ethical leadership and organizational misbehavior. To be able to study the mediating role of prototypicality on the relationship between ethical leadership and organizational misbehavior, we have followed the three steps by Baron and Kenny (1986). First we needed to show a significant relationship between the antecedent ethical leadership and the dependent vari-

able organizational misbehavior. As expected the regression analysis demonstrated a statistically significant negative relationship between the two ( $\beta = -.385, p < .01$ ). Hypothesis 1a is therefore accepted. Second we needed to show a statistically significant relation between ethical leadership and and prototypicality, and between prototypicality and organizational misbehavior. As expected the regression analysis show a positive and significant relationship between ethical leadership and prototypicality ( $\beta = .760, p < .01$ ). Hypothesis 2a is thus also accepted. Between prototypicality and organizational misbehavior the regression analysis shows a statistically significant negative relationship ( $\beta = -.390, p < .01$ ). Third we should measure the impact of prototypicality as a mediating variable. In the regression analysis prototypicality has been added as a mediator in the equation between ethical leadership (independent variable) and organizational misbehavior (dependent variable). Our results show that the significance of the  $\beta$  drops from  $-.385$  to  $-.202$ . This shows there is a mediating effect. The beta value of ethical leadership changes from statistically significant to non-significant. This implies there is a full mediation effect. Hypothesis 3a can hence be partially accepted.



**Figure 5.3:** Regression ethical leadership and organizational misbehavior



**Figure 5.4:** Regression ethical leadership and prototypicality

**Table 5.2:** Regression results ethical leadership and its three components and organizational misbehavior

	Organizational misbehavior			
	$R^2$	$AdjR^2$	$F$	$\beta$
Ethical leadership	.148	.132	9.55**	-.385**
Role modeling through visible action	.000	-.019	.009	.013
Rewards and discipline	.047	.029	2.59	-.216
Communicating ethics and values	.007	-.012	.378	-.084

Note: \*\*  $p < .01$

**Table 5.3.** Regression results ethical leadership and its three components and prototypicality.

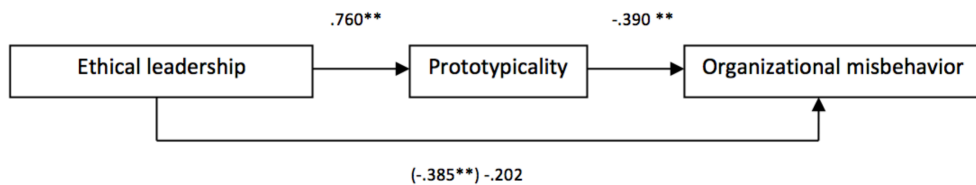
	Prototypicality			
	$R^2$	$AdjR^2$	$F$	$\beta$
Ethical leadership	.577	.570	79.10**	.760**
Role modeling through visible action	.026	.008	1.47	.161
Rewards and discipline	.078	.061	4.54**	.279
Communicating ethics and values	.468	.458	47.45**	.684**

Note: \*\*  $p < .01$

For practical implications we have also looked at the R-squared of this regression, which is 16.7%. This means that 16.7% of the variance in organizational misbehavior is caused by the variables ethical leadership and prototypicality.

The three ethical leadership components, role model behavior ( $\beta$  .013  $p > .1$ ), system of rewards and punishment ( $\beta$  -.216  $p > .1$ ), and communication on ethics and norms ( $\beta$  -.084  $p > .1$ ), show no statistically significant correlation with the variable organizational misbehavior. Hypotheses 1b, 1c and 1d should be rejected therefore. There are several reasons for this. The most important one is the fact that the organizational

misbehavior shows little explained variance. The variable has a reach between 0 and 7, but 63% has scored below 2 and less than 10% above 2.5. Relationships between other variables are thus less likely to be significant. As we found no statistically significant correlation, a mediation effect of prototypicality on the relationship between the ethical leadership components and organizational misbehavior (hypotheses 3b, 3c and 3d) cannot be measured. The regression analysis on the three ethical leadership components and prototypicality shows some conflicting results. Role model behavior and prototypicality appear to have no significant relation ( $\beta$  .161  $p > .05$ ). For the two other components (system of rewards and punishment and communication on ethics and norms) the relation was significant ( $\beta$  .279  $p < .05$ ,  $\beta$  .684  $p < .01$ ). Hypothesis 2b is therefore rejected, hypotheses 2c and 2d are accepted.



**Figure 5.5:** Regression for mediation results

**Table 5.4:** Regression for mediation results

	Prototypicality	Organizational misbehavior	Organizational misbehavior	Organizational misbehavior
Ethical leadership	.760**	-.385**		
Prototypicality			-.390**	
Ethical leadership Prototypicality				-.202
$R^2$	.577	.148	.152	.167
$F$	79.10**	9.55**	9.88**	5.43**

*Note: Relation between ethical leadership and organizational misbehavior and the mediating variable prototypicality. N=61, \*\*  $p < 0.1$*

#### 5.5.7. ADDITIONAL ANALYSIS

Additionally, we putted together the three components of ethical leadership into the variable 'composed components of ethical leadership' to examine the possible relations between the components of ethical leadership, prototypicality and organizational misbehavior. While the three separate components have no statistically significant relation with organizational misbehavior, the composed components of ethical leadership show to be statistically significant correlated with organizational misbehavior ( $\beta = -.251, p < .05, F = 3.172, p < .05$ ). In attaining more information on the separate components of ethical leadership, we examined the three components as independent variables of ethical leadership and looked at the coefficient R-square, which explains the variance in ethical leadership. The variance in ethical leadership is explained by 9.7%, 15.5% and 52.5% for role model behavior, rewards and discipline and communication about ethics and values respectively. More than half of the variance is explained by the variable 'communication about ethics and values'. Apparently this component determines the largest part of the effect of ethical leadership.

#### 5.5.8. TO CONCLUDE

In line with the hypotheses based on scholarly literature, the results of the research show that ethical leadership of battalion chiefs, as experienced by crew commanders, is negatively statistically related to the occurrence of self-reported disobedience of crew commanders. Being a group prototype or not seems to fully explain this effect, as it was found that prototypicality completely mediates the connection between ethical leadership and organizational misbehavior. Furthermore, no statistically significant relationship was found between the three separate components of ethical leadership (role modeling, rewards and discipline and communicating about ethics and values) and self-reported organizational misbehavior. Only the three components together seemed to be negatively statistically related to organizational misbehavior.

### 5.6. REFLECTION ON FADCM ASPECTS

#### 5.6.1. COMMUNICATION

The researches concluded that ethical leadership can only be effective when battalion chiefs are regarded as group prototypical by crew commanders. This investigation shows that this is not the case for the Amsterdam Fire Service. The battalion chiefs in the Amsterdam Fire Service were usually not regarded by crew commanders as group prototypical or 'one of the guys'.

The relevant question is whether battalion chiefs should attempt to become more prototypical group members so they are able to limit organization misbehavior by showing ethical leadership. Should they communicate norms and values that are in accordance with the crew? I do not think so due to two reasons: they are largely unable to become group prototypes and it is undesirable that they will show group prototypical behavior.

*Battalion chiefs are largely unable to be seen as group prototypes.*

Battalion chiefs who discuss (routine) organizational misbehavior conducted by subordinates are unlikely to be seen as group prototypes. This is a paradox: when an ethical leader discusses organizational misbehavior of the group, he dissociates himself from the group and consequently cannot be seen as group prototypical leader. However, when he tolerates the organizational misbehavior of the group in order to maintain group prototypical, he must give up his position as ethical leader expressing the norms and values of the organization.

In practice, battalion chiefs often attempt to overcome this paradox by investing in good relationships with individual members of the group. The assumption is that good informal communication with individual crew members will enhance the support from the crew and enforces the controllability of the group so that organizational misbehavior can be prevented. The social identity theory however shows that this strategy is unlikely to be effective in organizations characterized by a tight group culture (like the fire service, but also police and military). As individual group members are trying to survive in the group culture, they are unlikely to openly give support to the leader. They are more likely to prefer their group identity above their individual identity (Van Maanen, 2010).

It is even questionable whether battalion chiefs are able to achieve the full status of a group prototype. A battalion chief will always be hierarchically responsible for subordinates at the frontline and everybody in the fire services know that they are expected to carry out organizational policy. Consequently, for crew commanders and their crew battalion chiefs do not have an equal status. Furthermore, there are numerous visible and less visible cultural differences between battalion chiefs and subordinates reflected in difference in rank and privileges like a telephone, Ipad, a private work and sleep accommodation at the fire station, etc. In sum, both the natural as the artificial distance between battalion chiefs and subordinates should not be underestimated.

Therefore it seems essential to make a distinction between 'one of the guys' and 'being accepted by the group'. Battalion chiefs should behave themselves as being a frontline manager and should accept that they will not be regarded as group prototype. Battalion chiefs attempting to be 'one of the guys' are likely to raise expectations that cannot be met. A possible consequence of generating false expectations is a growing distrust and may trigger mechanisms of exclusion from the group. Further research is required on the question of how the acceptance of frontline managers such as battalion chiefs is influenced when they intervene in the case of organizational misbehavior. In anticipation of the answer to this question, we recommend that frontline managers stimulate informal group members to take care of organizational misbehavior. This recommendation is partly grounded in social identity theory which states that criticism is more likely to be accepted when it emerges from inside the group (Hogg et al. 2012). Battalion chiefs only should take disciplinary action in the case of serious violations. This however necessitates full support from senior fire service management.

*Battalion chiefs should not show group prototypical behavior*

Another question is whether battalion chiefs *should* take decisions that are regarded as ethical by crew commanders and firefighters. During incident response battalion chiefs have a specific role that may necessitate making decisions which dependent on the perspective and circumstances can be regarded as ethical or unethical by crew commanders. Although battalion chiefs are responsible for the effectiveness of the response, crew commanders state that battalion chiefs often meddle too much with what they see as their work. Crew commanders see decision making autonomy as an important value. Sometimes however, battalion chiefs are confronted with crew commanders making unsatisfactory decisions or taking unwarranted risks. Battalion chiefs who interfere in these situations are unlikely to be regarded as ethical leaders, particularly when battalion chiefs do not justify their interference during and/or after the event. In some cases this can result in conflicts between the battalion chiefs and crew commanders. In cases in which it can be concluded afterwards that decisions of crew commanders were evident unsafe (think of a battalion chief giving an order to crew commanders to withdraw from a burning building and the building collapsed a few minutes later), these conflicts can quickly be settled. But when these events are much less evident, battalion chiefs have to work hard to legitimize their decision afterwards.



There are two complicating factors. First, there are conflicting views within the fire service about how fires and other incidents can be best suppressed. These views are influenced by experiences that have been gained in similar incidents in the past, or unverified stories from other members of the fire service. Second, as noted before, decision making by crew commanders and firefighters during incidents is affected by cognitive impairments that occur under feelings of stress and time-pressure. Consequently, crew commanders and firefighters are not always able to effectively examine the environment in which they operate. Because battalion chiefs often arrive later at the scene of the event and have more possibilities to suppress high levels of stress and time-pressure, they are usually better able to assess the environment. This is precisely why it is not always desirable for battalion chiefs to strive for the position of ethical leader (from the perspective of crew commanders and firefighters). In sum, frontline managers in general and battalion chiefs particularly should not always do what his subordinates desire from them. Contrary, to be effective, frontline managers must dare to deviate from work routines that operate in the frontline.

## 5.7. METHODOLOGICAL REFLECTION

### 5.7.1. METHODOLOGICAL ASSESSMENT OF RESEARCH FINDINGS

**Table 5.5:** Methodological assessment

<b>External reliability</b>	Data were gathered during the crew commander 'theme meetings'. During these yearly meetings the majority of crew commanders comes together to meet each other and to get information about new professional and organizational procedures. It may be that this environment influences the way the survey was completed by the crew commanders. For instance, perceptions of group pressure may have had influence on the responses given to certain questions in the questionnaire.
<b>Internal reliability</b>	-
<b>Measurement validity</b>	Many crew commanders had difficulties with some of the questions in the questionnaire. Concepts of ethical leadership were sometimes considered to be vague and therefore we had to provide some examples. This may have influenced the answers given by the participants

	and consequently the reliability of research findings.
<b>Internal validity</b>	-
<b>External validity</b>	Three concerns with regard to the external validity of the research findings can be made. First, the crew commanders involved in our research were not randomly selected. It may be possible that the crew commanders who engage in (significant forms of) organizational misbehavior did not want to participate in our research and hence did not fill out a questionnaire. Second, the results of our research only reflect the opinion of crew commanders in the Amsterdam Amstelland Fire service, and hence is not <i>a priori</i> valid to other fire services. Nonetheless, some battalion chiefs with working experience in other fire services indicated that the degree of organizational misbehavior in the Amsterdam Amstelland Fire Service is not remarkable. Third, while the number of participants in our study was high in relation to the total number of professional crew commanders in the Amsterdam Amstelland Fire Service, the absolute number of participants was low. In sum, the results cannot necessarily be generalized to environments other than the Amsterdam Amstelland Fire Service.
<b>Ecological validity</b>	A major concern of the investigation is whether the findings in the study can be applied to natural settings. It seems that the way organizational misbehavior and ethical leadership are measured negatively affect (ecological) validity. For instance, as crew commanders and battalion chiefs rarely work together, we asked the crew commanders to think of the last battalion chief they worked with (in an emergency situation) when filling out the questionnaire. Some crew commanders reported that they found it difficult to think only of the last battalion chief they worked with. Another problem with the survey is that contextual factors could not be taken into account. Therefore, respondents have to rate the battalion chiefs' behavior

<b>Triangulation</b>	Triangulation of the results suggests divergence. In the survey most crew commanders reported that they typically do not show organizational misbehavior, while others seem to over-report the degree to which they misbehave. The interviews with battalion chiefs, however, provided a different view. Battalion chiefs were able to recall many incidents in which crew commanders and their crew conducted inappropriate behavior. Battalion chiefs and crew commanders may have a different understanding about what is ethical appropriate behavior during incidents. In addition, the literature points out various biases that are likely to be in play in research on organizational misbehavior, such as the social desirability bias (i.e. participants' tension to answer questions in a manner that will be viewed favorably by others). When applied to this investigation, this bias suggests that respondents are inclined to over-report 'good behavior' and under-report 'bad' or undesirable behavior. Although the anonymity of the respondents was guaranteed, it seems inevitable that the respondents have not reported all cases of organizational misbehavior.
<b>Opinion of participants</b>	Generally, both crew commanders and battalion chiefs were willing to cooperate in the investigation. Some crew commanders were glad they finally could give their opinion about the (absence of) leadership of battalion chiefs. Battalion chiefs were interested in the question whether being regarded as 'one of the crew' enforces their control capacity during incidents.

#### 5.7.2. COMMENTS ON THE APPROPRIATENESS OF THE RESEARCH METHODS USED

Survey research appeared to be not suited to obtain insight in the functioning of frontline commanders. For instance, the scales used in the scholarly literature to investigate ethical leadership were often poorly understood by crew commanders and had to be adjusted. In addition, it seems unlikely that the respondents truthfully filled out the questionnaire: both downplaying and magnifying organizational misbehavior are likely. To gain a better understanding of organizational misbehavior in general and the difference between the statements of crew commanders and battalion chiefs in

particular, participatory research is needed. In this participatory research, attention should be paid to the influence of contextual factors (e.g. why is a decision in one situation regarded as ethical and an identical decision in another situation not?), individual factors (e.g. why do crew commanders accept an order from battalion chief A and not battalion chief B?), and cultural factors (e.g. why does one group regard a decision as ethical and another group not?). In sum, the conclusion is that survey research is not appropriate for investigating complex and bias-sensitive topics as organizational misbehavior. It seems better to use participatory observation research method, optionally aided by helmet-mounted cameras.



## **Chapter 6. Incident command and control in exercises**

### **6.1. INTRODUCTION TO THE STUDY**

This chapter examines incident command and control practices of 23 battalion chiefs from a Dutch Fire Service during realistic exercises using largely identical scenarios. The observational study is concerned with all five FADCM aspects and attempts to uncover the contribution of battalion chiefs' command and control to response safety and efficiency. Helmet-mounted camera recordings in conjunction with field observation and brief after action interviews were used as data sources.

### **6.2. METHODOLOGY**

#### **6.2.1. PARTICIPANTS**

The participants were 23 battalion chiefs (22 male, 1 female) all working for the Twente Fire Service in the Netherlands. The Twente Fire Service is responsible for the fire service in the Twente region which is a rural area consisting of many small villages and a few larger cities of between 75,000 and 150,000 inhabitants.

In total, Twente Fire Service has 25 battalion chiefs. Data from 2 battalion chiefs is not involved in our research due to a methodological and practical reason:

- The first exercise was used as a test to gain understanding of the scenario, the way the exercise was organized as well as the quality and usability of the video recordings. During this exercise the fire service decided to adjust various minor aspects of the exercise such as the route designation to the incident scene, the roles of the actors and staging. We therefore decided to exclude this particular exercise from our dataset.
- More practically, as a result of traffic problems the first author of this research was unable to attend one exercise and therefore unable to mount the camera on the helmet.

The battalion chiefs' experience ranged from a few years to more than twenty years, as did their experience of incidents. Three of the 23 battalion chiefs were voluntary fire officers. This means that they fulfil the function of battalion chief on a part-time basis. The educational and training requirements for all battalion chiefs are the same, however.

#### 6.2.2. PROCEDURE

In 2010, the Twente Fire Service examined the command and control skills of their twenty-five battalion chiefs during a large-scale realistic exercise at a fire service training centre at Enschede Airport Twente. This examination was part of a larger internal programme aimed at investigating their level of competence. The fire service allowed us to observe the realistic exercises and to gather data with helmet-mounted cameras for scientific research.

The exercises were designed to reflect reality as much as possible and battalion chiefs were able to use the personnel and resources they normally use during real incidents. Each of the 23 exercises involved four engines and a heavy rescue vehicle. Each engine was manned by a crew commander and five fire fighters. The heavy rescue vehicle was manned by two fire fighters. To the crew commanders and fire fighters the exercise was a realistic training as they were not aware in advance of the scenario. For each exercise, crew commanders and fire fighters without prior knowledge of the scenario were used. It should be noted, however, that as a result of a limited number of fire fighters, some of them may have had prior knowledge of the scenario in the later exercises. Members of the exercise staff played the parts of police and ambulance commanders.

The battalion chiefs were informed about the research before the start of the exercise and could voluntarily decide whether they wanted to cooperate. All battalion chiefs agreed. A helmet-mounted camera (Contour HD) was mounted on the helmet of the battalion chief and was started at the moment the battalion chief received the alarm from the dispatch centre. After the alarm, the battalion chiefs had to drive to the incident scene and take command. As in reality, when the battalion chief arrived at the incident scene one or two engines had already arrived and had determined the initial priorities. The exercises were finished after all the victims had been found and rescued from the vehicles as well as the buildings and had been transported to the improvised field hospital. 19 exercises took place in the evening. As the incident scene was not lit, the initial fire operation took place largely in the dark until the moment an engine had set up mobile lighting devices. The other 4 exercises took place in daylight.

At the start of the exercise, we observed the arrival of the first engine and the subsequent units including the battalion chief. The video recordings were discussed afterwards with 12 battalion chiefs in order to gain more insight into the way they evaluated their own performance.

### 6.2.3. THE SCENARIO

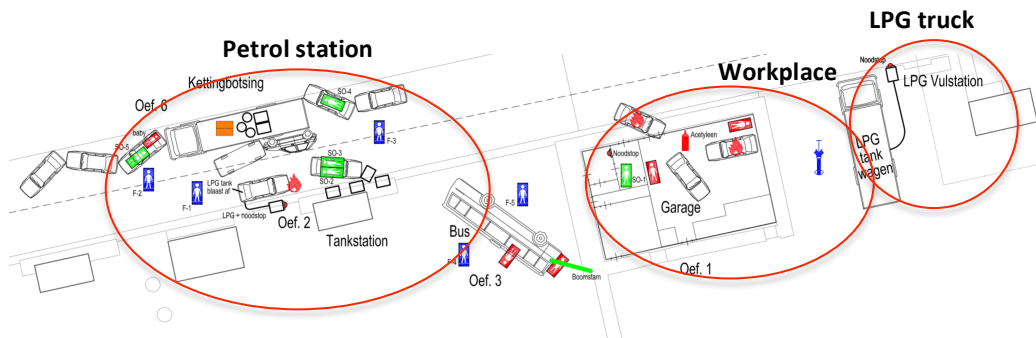
The scenario of the exercise involved a large-scale traffic incident in which multiple vehicles had collided. Casualties were trapped inside most of the vehicles and were relying on help from the fire service. One car had crashed into a petrol station damaging a fuel pump which had caused petrol spillage. The spillage had caused a liquid fire in front of one of the cars in which two victims were trapped. Another car at the petrol station was fuelling LPG. As a result of the crash, too much LPG had caused the LPG tank of the car to blow off. In the car collision, an army truck transporting an intermediate bulk container of hazardous materials was involved. The container was undamaged and was not a threat to the environment. One vehicle had crashed into the garage workshop and store located about 30 meters from the petrol station. This vehicle and the workshop were on fire. Two workshop mechanics were missing and assumed to be somewhere in the building, now full of toxic smoke. Next to the workshop, an LPG tank truck had been refuelling the petrol station. Inside the workshop a cylinder of acetylene could explode if it is not immediately cooled down by the firefighters inside the building. There were three versions of the exercise all deemed similar in work load (see figure 6.1):

- Version 1: A bus that had toppled over and crashed into a tree with two victims trapped under the bus.
- Version 2: A motorbike rider who had fallen into a large construction pit and had to be rescued with special apparatus.
- Version 3: A car that had crashed into a tree on a hill with multiple victims trapped under and in the car.

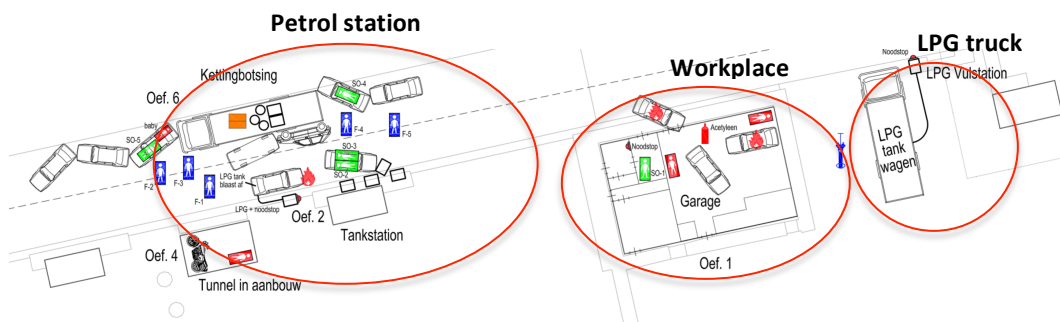
In each variation there were 15 casualties, comprising of live actors and dummies.



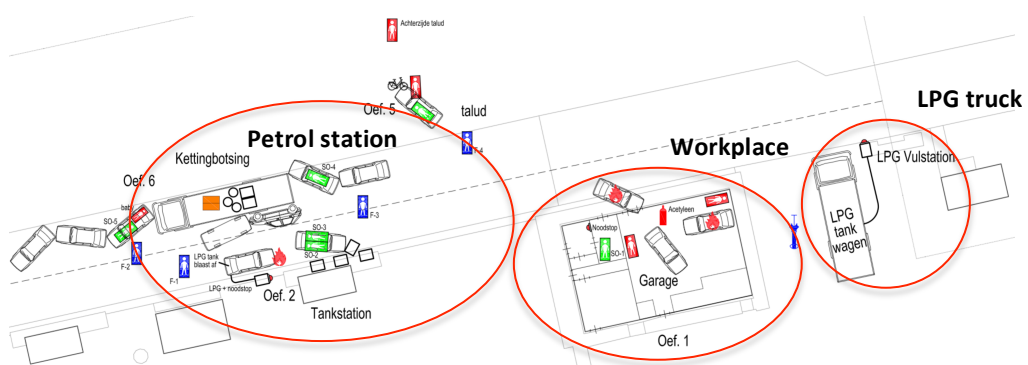
**Version 1:**



**Version 2:**



**Version 3:**



**Figure 6.1:** A diagram of the three versions of the scenario

#### 6.2.4. DATA ANALYSIS

Our intention was to objectively and systematically describe how battalion chiefs command and control by using the five functions of incident command (i.e. information gathering, analysing, decision making, communicating and monitoring) as an analytical framework. Based on these functions, various questions were formulated as a framework for the video analysis. These questions are shown in Table 1. Although we are aware that one of the tasks of battalion chiefs is consultation with other emergency services, we focused primarily on the interaction between battalion chiefs and crew commanders. We did, however, measure the time battalion chiefs took to consult with police and ambulance during the exercise.

In order to measure battalion chiefs' contribution to response safety and efficiency, we defined, in consultation with five senior fire officers, the critical actions that battalion chiefs should undertake in this particular scenario. These critical actions are also part of the analytical framework. We have incorporated these actions in the 'Analysis and Decision-making' section in Table 6.1.

**Table 6.1:** Analytical framework

Analytical framework		
	Question	Example
Information gathering	Number of questions raised about the task environment.	How many cars are involved?
	Number of questions raised about the response operation	Have you searched the area?
	Number of questions addressed to BC about the task environment.	Is there a gas leakage?
	Number of questions addressed to BC about the response operation.	What do you want me to do?
	360-degree survey conducted?	The BC first walks around the incident scene before asking for information or issuing orders

<b>Analysing and decision making</b>	BC orders the arriving units to approach the scene of the incident from both sides.	130, I want you to approach the scene from the side of the city of Enschede.
	Directly upon arrival, the BC conducts a 360-degree survey.	BC walks around the incident scene but from a distance.
	BC finds the containers with hazardous materials (during the 360-degree survey).	I see containers with hazardous materials but they are not broken. I have to verify.
	BC gives highest priority to ensuring a safe working environment in and around the petrol station.	110, I want you to activate the emergency stop at the petrol station first, and extinguish the liquid fire.
	BC asks crew commanders if they have activated the emergency stop of the petrol station.	Did you activate the petrol station's emergency stop?
	BC asks crew commanders if they have activated the emergency stop of LPG tank truck.	Did you activate the emergency stop of the LPG tank truck?
	When informed about the cylinder of acetylene inside the workshop, the BC tells the crew commander how to handle it	The acetylene must be cooled down, then take it out and throw it in a pool.
	BC orders the crew commanders to bring a combustible gas detector with them	110, I want you and your crew to wear combustible gas detectors.
	BC orders the crew commanders to do a final search of the environment when enough resources	120, there are no other tasks left, please do a final check of the environment.

	are available	
<b>Communicating</b>	Number of orders addressed to dispatch centre	Dispatch centre, I want you to send an alarm for two more engines at the scene.
	Total number of orders related to assigning units to tasks	120, you take the fire in the shop.
	Number of orders which confirmed actions already undertaken by crew commanders at the incident scene	110, OK so you are handling the petrol station? I will assign the next engine to the workshop.
	Number of orders that require crew commanders at the incident scene to carry out a task other than what they are doing	120, you take another car. The person in the car right there is more seriously wounded according to the ambulance medic.
	Total number of specific orders (who, what, why)	110, I want you to search in the woods and look for bodies because someone may have been thrown from the vehicle. Take a thermal camera with you.
<b>Monitoring</b>	Number of orders monitored	When a crew commander is ordered to rescue an entrapped victim, all questions related to that order count as monitoring that particular order.
	Number of questions related to the execution of a task without directly observing execution	110, how much time do you still need?
	Number of questions related to the execution of a	(when standing next to the 140): 140, everything

	task with direct observation of the execution	under control?
	Number of orders not executed by crew commanders	Battalion chief notices in conversation that crew commander is working on different car than agreed upon.

Additionally, we examined the time it took from the moment the alarm went out to the first engine, until the moment all casualties had been found, rescued and transported to the improvised field hospital (referred to as total exercise time). We also measured the time from the alarm until the moment of arrival at the scene, as well as the moment from arrival at the scene until the end of the exercise. It should be noted that time alone is not a suitable measure of battalion chiefs' effectiveness given that many factors were in play which influenced the exercise time. These range from how quickly the engines arrived at the incident scene, how hard fire fighters worked to perform their tasks, how fast the dispatch centre operated (depended on who the dispatcher was), decisions initially taken by crew commanders, and so on.

The video recordings were all analysed by the primary researcher. Each video recording was analysed by counting the number of questions, orders, etc. Except some brief notes, no verbal transcriptions were made of the video recordings. No qualitative data analysis software programs were used. To control for reliability or consistency in our results (i.e. inter-reliability), a second researcher also used the framework to analyse the video sequences. A comparison between the results resulted in a slightly adjusted formulation of items but uncovered no differences in interpretation.

## 6.3. RESULTS

### 6.3.1. GENERAL FINDINGS

Before we present the results obtained through the analytical framework, we shall first provide a qualitative general, typical, description of the incident command and control of most battalion chiefs. While travelling to the incident scene, all battalion chiefs asked the dispatch centre for more information about the location, the availability of emergency plans and procedures for the particular location, as well as casualties. Additional units were also often requested while travelling to the incident scene. Once they arrived at the scene, battalion chiefs typically searched for the crew com-

mander, who was the first on the scene, to obtain information and get a global overview of the priorities as perceived by the crew commander. Most battalion chiefs used this information to make a diagram of the situation. This diagram was used to assign tasks to arriving engines, a task that took up most of the first half of the exercise. Sometimes, though, it took a relatively long time before tasks were assigned to arriving units since battalion chiefs first wanted to have a sound understanding of the situation before assigning tasks. A lot of time was spent creating a diagram of the situation, including the number of victims in each car and the severity of their injuries. In most exercises a correct diagram had been completed by the end of the exercise. Most battalion chiefs decided to regularly call together all the crew commanders to exchange views on the incident, gather information about task progression and divide tasks. During the whole exercise, most battalion chiefs had three consultations with police and ambulance staff. When all requested units had been assigned tasks, most battalion chiefs decided to inform the dispatch centre, to consult ambulance and police and to walk around to monitor task progression.

A methodological observation is that several battalion chiefs noted later that they worked according to how they are supposed to work and argued that reality is often quite different. Since it had been an official study, the battalion chiefs had felt obliged to work 'according to the book', i.e. the way they had been instructed at the National Fire Academy and during previous exercises at the Twente Fire Service.

In the after action interviews, the battalion chiefs stated that they were positive about the usage of helmet-mounted cameras. They reported that they noticed little of wearing the camera. In addition, the camera recordings gave them accurate (and sometimes confronting) insight into the way they had operated during the exercise. Most of the battalion chiefs experienced the exercise environment to be realistic, unlike the very demanding scenario and high time pressure under which had to be operated.

#### 6.3.2. INCIDENT TIME

Table 6.2 shows the average exercise time and standard deviation for all 23 exercises. The average incident duration (time from the alarm until the end, defined as the moment all victims have been transported to the field hospital) is about 67 minutes, of which 10 minutes were used en route to the incident ground and the remaining 57 minutes at the incident ground. At the incident ground, an average 22% of the time was used to consult with ambulance and police.

**Table 6.2:** Average exercise time and standard deviation for all 23 exercises

Exercise #	Time from alarm until end	Time from alarm until arrival BC at incident	Time from arrival BC at incident until end	Time in consultation with ambulance and police	Time in consultation with ambulance and police
1	63	13	50	10	20%
2	68	8	60	14	23%
3	63	10	53	15	28%
4	74	9	65	10	15%
5	66	7	59	10	17%
6	70	12	58	11	19%
7	66	7	59	14	24%
8	64	10	54	15	28%
9	73	8	65	14	22%
10	64	11	53	15	28%
11	64	11	53	11	21%
12	66	9	57	14	25%
13	66	10	56	10	18%
14	58	7	51	12	24%
15	66	9	57	15	26%
16	65	15	50	16	32%
17	72	10	62	12	19%
18	66	9	57	12	21%
19	69	10	59	13	22%
20	72	12	60	8	13%
21	66	15	51	18	35%
22	69	7	62	8	13%
23	67	10	57	10	18%
<b>Mean</b>	<b>66.83</b>	<b>9.96</b>	<b>56.87</b>	<b>12.48</b>	<b>22%</b>
<b>SD</b>	<b>3.63</b>	<b>2.26</b>	<b>4.36</b>	<b>2.59</b>	

An assumption held by the Twente Fire Service was that the battalion chiefs' time of arrival was associated with the remaining time it took to bring the exercise to an end. More specifically, the assumption was that battalion chiefs are necessary to assign tasks to the units and once they arrive on the scene, they hasten the response opera-

tion by dividing tasks and assigning them to fire engines as efficiently as possible. To test this assumption, we examined the correlation coefficient between the time from the alarm until their moment of arrival and the time from their arrival until the end. Contrary to expectation, however, we found a moderate negative correlation (-0.55). Although a causal relationship cannot be proved, this suggests that the later the battalion chief arrived, the sooner the exercise was finished.

Table 6.3 shows the average exercise time and standard deviation for each variation of the scenario. Additionally, we made a distinction between exercises that took place in daylight and in darkness to reveal whether visibility makes a difference to the response time. Given the relatively few exercises carried out by the groups, we could not conduct a reliable statistical analysis. It appears, however, that the differences between the day and evening exercises were minimal.

**Table 6.3:** Average exercise time and standard deviation for each variation of the scenario

Variation	Total # exercises	Mean overall exercise time (minutes)	SD (minutes)
<b>Day and evening (darkness)</b>			
1	8	66.75	3.19
2	7	69	3.46
3	8	65	3.12
<b>Day only</b>			
1	1	64	-
2	1	72	-
3	2	62	4
<b>Evening only</b>			
1	7	67	3.23
2	6	69	3.50
3	6	66	1.91

### 5.3.3. INFORMATION GATHERING

As stated in Table 6.4, all battalion chiefs asked more questions than they received from crew commanders. Most questions from battalion chiefs were related to the task environment, particularly about the severity and scope of the situation and safety aspects. Crew commanders were generally less likely to ask questions. Most ques-



tions concerned the response operation and, particularly, task assignment. We found no statistical relation between the number of questions raised by and addressed to battalion chiefs.

**Table 6.4:** Number of questions

Question	Mean	SD
Number of questions raised about the task environment	10.56	04.46
Number of questions raised about the response operation	05.68	01.97
Number of questions addressed to BC about the task environment	02.13	01.33
Number of questions addressed to BC about the response operation	04.61	02.84

Notably, the number of questions says little about the quality of the questions. We noticed that most questions were vague and abstract such as ‘What is going on here?’ or ‘Is it safe to work here?’ The first question often resulted in crew commanders relaying everything they had done since the start of the operation. The second question often produced a simple ‘Yes’, an answer that was good enough for most of the battalion chiefs. As admitted by the 12 battalion chiefs we interviewed afterwards, such an answer reveals very little information about the safety of the situation. Furthermore, the videos showed that after receiving information little effort was put into checking that information by means of visible inspection or consulting of alternative sources.

#### 6.3.4. ANALYSING AND DECISION MAKING

Table 6.5 presents the findings regarding the critical actions that need to be undertaken in the scenario. As evident from Table 5, a large part of the critical actions were performed by crew commanders (for instance, approaching the scene from two sides or finding the containers with hazardous materials). One would expect battalion chiefs to focus on the remaining critical actions. This was not the case, however. Many of the critical actions that could be carried out only by battalion chiefs (mostly safety related) received little to no attention:

- Only 5 of the 23 battalion chiefs conducted a 360-degree survey immediately on arrival. Interestingly, this was no guarantee for noticing the containers of hazardous materials as can be seen in Exercise 17.
- None of the battalion chiefs intervened in the 10 exercises in which the first arriving crew commander had not given top priority to the petrol station where an ex-

plosion was imminent. In these exercises, the first arriving crew commander decided to give priority to the fire in the workshop instead of the petrol station. This can be explained by the fact that this is the first area of the incident site they see when they arrive at the scene. When battalion chiefs arrived at the scene, the second or even third crew commander was assigned to the petrol station by the first arriving crew commander. The point here, however, is that fire fighters from the first engine, as well as other emergency service personnel, often operated in an unsafe environment. Given that safety is a major task of battalion chiefs, they might have been expected to withdraw their units until the situation in and around the petrol station was stabilized.

- Only 8 of 23 battalion chiefs verified explicitly whether the emergency stop of the petrol station had been activated. Only 5 of 23 battalion chiefs raised this question in connection with the LPG tank truck.
- Only in 3 exercises did the battalion chiefs provide detailed information on how to handle the acetylene cylinder. It should be noted that in 5 exercises the battalion chief was not informed about the presence of acetylene inside the workshop.
- Only 3 of 23 battalion chiefs ordered one or more crew commanders to wear a combustible gas detector. When such an order was not issued, we saw only one crew member wearing combustible gas detectors.
- In 14 exercises, the battalion chief did not verify if a final search of the environment had been conducted.

**Table 6.5:** Findings regarding the critical actions that need to be undertaken

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Exercise 1	BC	No	CC	13	Yes	No	CC	Yes	CC	No	Yes	No	Yes	No	none
Exercise 2	BC	No	none		No	No	CC	No	CC	No	Yes	No	No	No	CC
Exercise 3	DC	No	CC	10	No	No	none	No	CC	No	Yes	No	No	No	BC
Exercise 4	CC	No	CC	6	Yes	No	BC	Yes	CC	Yes	Yes	Yes	No	No	BC
Exercise 5	CC	Yes	CC	10	Yes	No	CC	Yes	CC	Yes	Yes	Yes	No	No	CC
Exercise 6	DC	Yes	CC	7	Yes	No	CC	No	none	No	Yes	No	No	No	none
Exercise 7	DC	No	none		Yes	No	none	No	CC	No	No	No	No	No	CC
Exercise 8	BC	No	none		Yes	No	none	No	CC	No	Yes	No	No	No	none
Exercise 9	CC	No	BC	8	Yes	No	none	No	none	No	Yes	Yes	No	Yes	none
Exercise 10	CC	No	BC	1	Yes	No	CC	Yes	CC	Yes	Yes	No	No	No	BC
Exercise 11	CC	No	BC	5	Yes	No	CC	Yes	CC	No	No	No	No	No	CC
Exercise 12	BC	Yes	BC	16	No	No	CC	No	CC	Yes	Yes	No	No	No	BC

Exercise 13	BC	No	BC	3	No	No	none	No	none	No	Yes	No	No	No	none
Exercise 14	DC	No	CC	1	Yes	No	CC	No	CC	No	Yes	No	No	No	none
Exercise 15	non e	No	CC	3	No	No	CC	Yes	BC	Yes	Yes	No	No	Yes	none
Exercise 16	CC	No	CC	4	Yes	No	CC	No	none	No	No	No	No	No	none
Exercise 17	CC	Yes	none		Yes	No	CC	No	CC	No	Yes	No	No	No	none
Exercise 18	non e	Yes	CC	7	No	No	none	No	none	No	Yes	No	No	No	none
Exercise 19	DC	No	BC	26	No	No	none	No	none	No	No	No	No	Yes	none
Exercise 20	BC	No	BC	18	No	No	CC	No	none	No	Yes	No	No	No	BC
Exercise 21	DC	No	BC	15	No	No	BC	Yes	CC	No	Yes	No	No	No	none
Exercise 22	CC	No	BC	19	Yes	No	CC	No	none	No	No	No	No	No	none
Exercise 23	CC	No	BC	24	No	No	BC	Yes	none	No	Yes	No	No	No	none

**Legend table 6.5**

1	Who initiates the decision to approach the incident scene from both sides?
2	Does the BC conduct a 360-degree survey directly on arrival?
3	Who finds the containers of hazardous material?
4	How many minutes after arrival were the containers of hazardous material found?
5	Is the petrol station regarded as the highest priority by the first arriving CC?
6	Does the BC adjust the priorities and actions taken by the first arriving CC?
7	Who initiates activation of the emergency stop at the petrol station?
8	Does the BC ask explicitly if the emergency stop at the petrol station has been activated?
9	Who initiates activation of the emergency stop of the LPG tank truck?
10	Does the BC ask explicitly if the emergency stop of the LPG tank truck has been activated?
11	Is the BC informed about the cylinder of acetylene inside workshop?
12	Does the BC explain how the crew commander should handle the acetylene?
13	Were the fire fighters wearing combustible gas detectors when the BC arrived?
14	Does the BC issue the order to wear a combustible gas detector?
15	Who initiates a final search of the environment?
DC	Dispatch Centre

BC	Battalion Chief
CC	Crew Commander

We did not find any statistical relation between what battalion chiefs do as formulated in our analytical framework (information gathering, communicating and monitoring) and the critical actions as stated in Table 6.5. For instance, no relationship existed between the number of questions raised or issues ordered (which may say something about the workload of the battalion chief) and whether the battalion chiefs checked if the emergency stops had been activated.

#### 6.3.5. COMMUNICATING

On average, battalion chiefs issued about 17 orders during the exercises. Table 6.6 shows the mean and SD for the different types of orders. Most of the orders concerned assigning units to new tasks: crew commanders receiving a task on arrival at the scene ('You take that car') or after a task was completed ('When the workshop is finished, you take that car').

**Table 6.6:** Orders issued during exercises

Type of order	Mean	SD
Number of orders addressed to dispatch centre	6.87	2.40
Total number of orders related to assigning tasks to units	8.35	2.39
Number of orders which confirmed actions already carried out by crew commanders at the scene	1.83	1.01
Number of orders that required crew commanders at the scene to do something different from what they were doing	0.43	0.82
Total number of specific orders (who, what, why)	0.78	1.14
Average total number of orders	17.48	3.40

Very few orders required crew commanders to stop their current task and do something completely different. In most exercises, crew commanders confirmed the initial decisions taken by crew commanders and subsequently gave orders to arriving units to carry out the remaining tasks. As already mentioned, very few orders were made specific. Orders were often vague leaving operational decisions to the crew commanders, such as 'If you have time, please search the environment', 'You take this storey' and 'This car is yours'. According to the interviewed battalion chiefs, very little attention is usually devoted to communication aspects in training environments.

#### 6.3.6. MONITORING

As presented in Table 6.7, just over 4 orders were monitored during the exercises. Most orders were monitored without direct observation of the execution of the task. Battalion chiefs often chose to gather all the crew commanders together and ask them separately about task progression.

**Table 6.7:** Orders monitored during exercises

Monitoring	Mean	SD
Number of orders monitored	04.65	0.56
Number of questions related to the execution of an assignment without direct observation of its execution	07.26	5.15
Number of questions related to the execution of an assignment with direct observation of its execution	05.70	4.24

Generally, monitoring task execution resulted in very few comments or additional instructions about how the task should be executed. Battalion chiefs preferred to walk around watching progression and raising general questions ('Do you need additional resources?', 'How long will it take?', 'How is it going?' etc.). During discussions after the exercise, there was a widely supported view that crew commanders should be regarded as professionals who know what they are doing. This is in sharp contrast, however, with our field observations in which the exercise staff frequently drew our attention to the number of errors made by fire fighters and crew commanders, such as using the wrong extinguishant, standing too close to the acetylene during extinguishing, setting wrong priorities, forgetting to take along a combustible gas detector, using an incorrect smoke ventilation strategy, etc.

Based on the video analyses, we conclude that in two exercises at least one task was not carried out by the crew commander as ordered. In the first case, a crew commander did not withdraw from the workshop to explore the store but stayed inside. Another crew commander in the building reported this to the battalion chief, which resulted in a more explicit assignment to both crew commanders. In the second case, a crew commander started rescue activities at a vehicle holding fewer injured victims. When the battalion chief noticed this, he asked why the crew commander had taken the wrong car but did not wait for the answer and assigned another crew commander to the other car.

#### **6.4. REFLECTION ON FADCM ASPECTS**

Generally, in the study it was found that the amount of information gathered, questions received, orders issued and monitored varied between the battalion chiefs, but we were unable to find patterns between what they did and the extent to which they contributed to response efficiency. Correlation analysis could not provide any evidence that battalion chiefs were able to make the response operation more efficient when they arrived at the scene. Rather, in this particular scenario, it seems that the way tasks were executed, fire fighters were far more significant in regard to the incident time than the incident command and control by battalion chiefs.

##### **6.4.1. FACTFINDING**

The helmet-mounted camera video recordings show that battalion chiefs generally raised 10 questions about task environment and 6 about the incident operation. Most of the questions were abstractly formulated and consequently multi-interpretable for crew commanders. The video recordings show that battalion chiefs primarily relied on the information provided by crew commanders. Based on the camera-recordings, it can be concluded that only 5 of the 23 battalion chiefs conducted a 360 degree survey.

##### **6.4.2. ANALYSIS**

The video recordings suggest that battalion chiefs primarily used their reasoning capacity for identifying the tasks, mapping the incident site and subsequently assigning the available units to tasks. During the interviews, battalion chiefs explained that they used this approach because (a) it was taught at the Fire Academy and (b) they were examined on this. These activities seem to consume much analytical capacity. Previous research has noted that high workload could be detrimental for decision quality (McLennan et al. 2003). Although we did not measure workload quantitatively, we observed along the same lines that battalion chiefs were unlikely to handle two tasks successfully at the same time. For instance, in one exercise a battalion chief was concentrating hard on creating a diagram of the situation and consequently missed safety maintenance issues around the petrol station. In another exercise, the battalion chief was consulting with ambulance workers and police and was consequently unable to monitor how his orders were carried out.

##### **6.4.3. DECISION MAKING**

In the case of safety-related critical elements of the scenario, we found that battalion

chiefs rarely provided explicit guidance as to how to deal with the situation at hand. In fact, it seemed that crew commanders made the most important decisions on which battalion chiefs often relied unquestioningly, particularly during the first half of the exercise, such as the decision to approach the scene from both sides, which problem should be dealt with first and the actions that need to be carried out to create a safe working environment. Based on NDM research, however, full reliance on crew commanders is undesirable since there are many biases in play that distort situation assessment and decision-making when doing life-threatening work under high time-pressure (Zsombok & Klein, 1997). Given that battalion chiefs arrive after the first or second engine has arrived, they are able to check the initial actions taken at the scene and look for critical signs in the environment for which the first arriving units do not have time. However, this was not what battalion chiefs did.

#### 6.4.4. COMMUNICATION

The video recordings show that on average battalion chiefs provided 17 orders. Most orders were related to assigning units to tasks. In almost all cases the formulation of the orders did not comply with theoretical requirements of a well-formulated order. In contrast to Rake & Nja (2009), we found that battalion chiefs issued quite a number of orders to crew commanders. There are several possible explanations for this difference. First, it could be a matter of how orders are defined. Second, it could also be related to the scenario that was studied. Third, in our investigation we studied battalion chiefs from a fire service while Rake & Nja (2009) studied incident commanders who are primarily concerned with multidisciplinary cooperation. Fourth, in our study we investigated command and control in exercises while Rake & Nja (2009) examined command and control both in exercises and practice. For a more reliable comparison, we propose that similar types of commanders should be studied and compared in the future. Finally, cultural differences between fire services in the Netherlands and abroad could also be an explanation.

#### 6.4.5. MONITORING

There was consensus among battalion chiefs that strict monitoring is not necessary since crew commanders should be regarded as professionals. Consequently, very few orders were monitored and even less interventions took place after fire units were assigned to tasks. This seems to be no problem since crew commanders appropriately carried out most orders. The field observations have shown, however, that a more critical manner of monitoring task execution may be required in particular situations. An explanation for the strong reliance on crew commanders may be the sunk cost

bias, which could be defined as persisting with a tactic simply because time and resources have already been invested in the tactic (McLennan et al. 2003). During the discussion of the video recordings with the battalion chiefs, very few were aware of the existence of this bias.

## 6.5. METHODOLOGICAL REFLECTION

### 6.5.1. METHODOLOGICAL ASSESSMENT OF RESEARCH FINDINGS

**Table 6.8:** Methodological assessment

<b>External reliability</b>	The study cannot be completely replicated since the participants know the scenario of the exercises which is likely to affect the way they operate during the exercise. However, as the actions of all battalion chiefs were recorded, a reanalysis of the video-recordings is possible.
<b>Internal reliability</b>	Although the video recordings were analyzed by one researcher, it seems important to examine the inter-rater reliability by two or more researchers. In this study, initially two researchers used the analytical framework to examine whether the video-recordings were analyzed in the same way. This revealed some differences in interpretation after which the analytical framework could be slightly changed.
<b>Measurement validity</b>	-
<b>Internal validity</b>	-
<b>External validity</b>	We have investigated incident command and control of battalion chiefs working only in a single organization. Though educational and training requirements are largely similar in the Netherlands, the results in our study are not necessarily representative for all battalion chiefs.
<b>Ecological validity</b>	A limitation of investigating command and control during operational exercises is the limited ecological validity of the findings. A structural problem of exercises is that feedback from the environment is not necessarily realistic. For instance, the interviewed crew commanders pointed out that they would not have implemented cer-



	<p>tain orders provided by some battalion chiefs when it was a real incident. In addition, some crew commanders stated that normally they would not have waited on orders provided by crew commanders. Another limitation of operational exercises is that battalion chiefs are likely to behave as they think they should behave by their reviewers and consequently do not show behavior that they would normally show during real incidents. Finally, it should be noted that the results of the study relate only to one particular scenario and more research is required to examine whether the results hold in a different scenario and/or training environment.</p>
<b>Triangulation</b>	<p>Triangulation of results generates complementation. Helmet-mounted cameras provided an accurate view on the functioning of battalion chiefs during exercises. In the video-aided after action review, the battalion chiefs appeared to be unaware of their behavior during incidents. This suggests that they did not deliberately act different because their operation was recorded. Interviews provided a first insight into the motivation of battalion chiefs for their functioning. By observing the exercises in situ, the initial actions of crew commanders could be examined at the moment the battalion chiefs were attending to the scene of the event. In addition, by in situ observations the actions of crew commanders and their crew could be better examined. During the examination of the helmet-mounted camera recordings, we discovered that more data could have been gathered during the in situ observation, e.g. about the time it took before all victims were found and rescued. An important methodological finding of the study is therefore that multiple data methods are required to get a deep understanding of the contribution of battalion chiefs to the incident response.</p>
<b>Opinion of participants</b>	<p>In general the participants were positive about the usage of helmet-mounted cameras. After the exercise the battalion chiefs reported that they noticed little of wearing</p>

the camera. In addition, the camera recordings gave them accurate (and sometimes confronting) insight into the way they had operated during the exercise. Most of the battalion chiefs experienced the exercise environment to be realistic, unlike the very demanding scenario and high time pressure under which had to be operated.

#### 6.5.2. COMMENTS ON THE APPROPRIATENESS OF THE RESEARCH METHODS USED

As stated above, there seems to be a considerable difference between incident command and control during exercises and in the real world. According to the battalion chiefs, the workload during the exercises was high and the time rate unrealistic. In addition, we also observed that crew commanders, in general, behaved subordinately to battalion chiefs since they knew that it was an official study. In reality, as some of the battalion chiefs admitted, crew commanders would act more independently.

However, researching incident command and control during operational exercises has some advantages. Exercises with identical scenarios and fully staffed fire engines (so called prof checks) provide an opportunity to examine patterns in command and control practices of different battalion chiefs. Another advantage of a training environment is that a selection bias can be prevented since all battalion chiefs are deemed to participate in the training. The use of helmet cameras in training settings has some limitations. First, the quality of the footage and the sound is not always good. The result is that in a few cases the battalion chief cannot be understood or it is invisible what crew commanders operating in the background are doing. Second, knowledge on fire operation processes is necessary to understand what is going on in the video recordings. Third, helmet-mounted cameras give only insight into what battalion chiefs did, but not necessarily why they did it. As these limitations can be overcome in a training environment by using multiple cameras and using additional research methods, the conclusion is that helmet-mounted cameras can provide reliable data about command and control.

One should keep in mind that the analytical framework used in the study covers only some aspects of incident command and control and that more work needs to go into expanding the analytical framework. For instance, we were interested in investigating the effect of incoming information on battalion chiefs' decision making but we were unable to find a method to systematically measure the incoming information. In addition, examination of the added value of battalion chiefs necessitates not only the

studying of speech forms but also more tacit aspects. For instance, it could be argued that by simply being present at the incident scene, battalion chiefs influence the behaviour of frontline units. To investigate this possible effect, we recommend examining a range of exercises with and without battalion chiefs being present at the incident scene. In addition, to arrive at a more comprehensive examination of how incident command and control of battalion chiefs relate to effectiveness, we believe that measurement by means of participation in situ should be carried out at more time points. Furthermore, the perceptions of crew commanders might need to be incorporated into the study of battalion chiefs' contribution to effectiveness.

## Chapter 7. Incident command and control in real practice

### 7.1. INTRODUCTION TO THE STUDY<sup>6</sup>

This chapter examines battalion chiefs' incident command and control practices in 55 real incidents in the Netherlands. The aim is to examine the degree to which they were in control over the incident response by looking at the orders they issued and the degree to which these orders were carried out appropriately. The observational study is concerned with all five FADCM aspects. Helmet-mounted camera recordings in conjunction with participant observation and interviews were used to gather data.

### 7.2. ANALYTICAL FRAMEWORK

To study the video recordings, an analytical framework was developed based on research findings from both NDM and incident command and control research. Due to practical and methodological considerations, only some aspects of NDM and research on incident command and control have been used in the development of the analytical framework. The analytical framework follows the five steps of the FADCM model.

- *Factfinding*. NDM theories point to the importance of proactive information gathering and raising additional questions to check assumptions. In the analytical framework, factfinding includes questions about whether the BC proactively or reactively responded to the situation at hand, whether additional questions were asked and whether BCs had direct visual line of sight of the problem at hand.
- *Analyses*. According to NDM theories, incident commanders must engage System 2 thinking rather than rely on a recognition-primed decision making model in which the first option that came to mind is instinctively chosen. To get an indication as to whether System 2 was used, we looked at whether alternative solutions were discussed by BCs.
- *Decision making*. According to NDM theories, incident commanders should limit the number of incidents. In the framework we therefore looked at the number of orders issued in relation to the incident response and safety. In addition, we were

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<sup>6</sup> This chapter is based on: Groenendaal, J. & Helsloot, I. (accepted for publication). An examination of command and control by incident commanders of Dutch fire services during real incidents. *Journal of Contingencies and Crisis Management*.

interested to know how many interventions BCs made and who came up with the solution that was chosen.

- *Communication*. Based on NDM theories, communication includes questions about the formulation of the order (goal, techniques and actions prescribed, motivation, recipient, etc.).
- *Monitoring*. Based on NDM theories, monitoring includes a question about whether the order was understood by subordinates and a question about whether the implementation was checked by the BC.
- *Result*. The final question in the analytical framework is whether the order is carried out as intended.

The table below (Table 7.1) shows how the different items of the analytical framework are operationalized and provides an example for each item.

**Table 7.1:** The analytical framework

<b>Analytical framework</b>		
	<b>Definition</b>	<b>Example</b>
<b>Factfinding</b>		
Are BCs responding proactively or reactively to the situation at hand? (proactively/reactively)	Responding proactively means anticipating a possible event in the environment, without being informed by others.	BCs at the incident scene: 'Crew commander, is the tram's electricity system switched off?'
	Responding reactively means being confronted by an event in the environment as a result of one's own observation or being informed by others.	Crew commander arrives at the scene and ask for a task. Or firefighter indicates that he has found asbestos.
Do BCs ask for additional information about the situation on which they are about to decide? (yes/no)		Is the automatic foam extinguish system still working? Are they wearing breathing apparatus?
Do BCs have direct visual line of sight of the situation at hand? (yes/no)	(based on helmet camera view)	When looking at the front of the fire, the BC assigns a task to an arriving crew commander.
<b>Analysis</b>		
Are alternative solutions	Alternative solution	CC: I think it would be

being discussed by BC? (yes/no)	means that at least two solutions to the problem at hand are discussed.	better to arrange large-scale water supply first. BC: Yes.
<b>Decision making</b>		
Is the decision an intervention? (yes/no)	An intervention is defined as a decision that stops or changes an action already taken by a CC.	Stop, a fire truck should be placed between manifold and the ladder.
Who introduced the chosen solution?	BC, CC, Chemical advisor or other.	CC: We will no longer enter the building. BC: No, indeed (...)
<b>Communication</b>		
What was the order given?		If (name) needs help, assist him. Yes, assist (name).
Was the purpose of the order explicated? (yes/no)	A purpose is a result or effect that is intended or desired.	I want you to avoid expansion of the fire on that side.
Are means or techniques prescribed (yes/no)	Means here indicates fire apparatus (i.e. engine or manifold) and a technique is a way to mitigate the consequences (i.e. water cannon).	I want you to make a water screen over there.
Was a certain action prescribed? (yes/no)	The action should be specific and executable.	Wait here for further details.
Was the prescribed action motivated? (yes/no)	An explanation for the prescribed action is provided.	Wait here for further details, I don't yet know what's going on and must first gather more info.
Was the intended recipient clarified? (yes/no)	In the case of multiple crew commanders, the intended recipient is clarified.	I want (name) to make the water supply connection
<b>Monitoring</b>		
Do BCs check when finishing the order communication if the order has been properly understood? (yes/no)	This involves asking a question to check if the given order has been properly understood by CCs.	To finish, please summarize what you are going to do.

Do BCs check if the order was properly carried out? (yes/no/undefined)	This involves raising questions about or observing task execution. Undefined means that the implementation process was not recorded.	CC, is water already being used on the fire?
<b>Result</b>		
Was the order executed as communicated by the BC? (yes/no/undefined)	Undefined means that based on the helmet camera movies, no statements can be made about the implementation of the order.	After having ordered that no one should enter the building, the BC is confronted with two firefighters walking out of the building.

### 7.3. METHODOLOGY

#### 7.3.1. PARTICIPANTS AND DATA GATHERING

Battalion chiefs (BCs) of three regional fire services in the Netherlands (Amsterdam-Amstelland, Limburg-Zuid and Rotterdam-Rijnmond) were invited to participate in the research. Nine BCs voluntarily responded to our invitation and were equipped with a helmet-mounted camera. The BCs were all experienced fire chiefs with multiple years experience. In the Netherlands, battalion chiefs are among the highest ranking front-line commanders and are in charge of up to 4 crew commanders. Crew commanders are the firemen in charge of a crew of fire fighters and their responding apparatus (i.e. engine, ladder, squad). In the Netherlands, battalion chiefs are responsible for the safe, efficient and effective deployment of fire service resources. More specifically, they are responsible for determining priorities, directing the deployment of resources, assigning company officers to particular tasks, monitoring the operations and aligning decision making within the fire service and initially also between the fire service and other emergency services (i.e. inter-organizational coordination) until a second battalion chief is called to the scene.

The participating BCs were asked to use the camera each time they were called to an emergency and to activate the camera when operating at the incident scene. The BCs were free to decide, however, whether to activate the camera and could also stop the camera when deemed necessary. Video recordings of some 55 incidents were supplied by BCs over a three-year period (2010-2013). According to the participating BCs, the cameras were not always used due to technical problems (e.g. the camera was

not charged) or simply because they forgot to activate it when in action at the incident scene.

In addition to the usage of helmet-mounted cameras, two other research methods were used. First, the participating battalion chiefs were interviewed about their experiences with the helmet-mounted cameras and several incidents which were captured. Second, three battalion chiefs of the Amsterdam-Amstelland Fire Service were observed in practice (participatory observation) to get an initial understanding about the work of battalion chiefs and the kind of incidents they experience on a shift.

#### 7.3.2. DATA ANALYSIS

To establish the extent to which battalion chiefs controlled the frontline work, we analysed the relationship between information, the orders given by battalion chiefs and the degree to which frontline workers carried out these orders. It should be noted here that in regard to methodology, it is difficult to determine the effect of the presence of BCs at the incident scene on the emergency response. Even without orders being issued, crew commanders may feel obliged to follow organisational procedures due simply to the BC's presence at the incident site. In this research we examine the degree to which BCs were in control, only by looking at the relationship between orders given and the implementation of these orders by frontline workers.

In the first step of the data analysis, all video recordings were collected. In total, 55 video recordings consisting of 1921 minutes of video material were supplied. In some cases the BCs provided additional information (e.g. logs from the dispatch centre, an investigation report). In the second step we transcribed all video-recordings. In the third step we analysed the transcriptions by using the analytical framework. In this step we collected all fragments in which an order was issued in relation to a) the incident response (assigning units to tasks and orders about the incident response) and b) safety of own resources and the environment. We did not include in the analysis orders to the dispatch centre in regard to requests for additional units at the incident scene. We subsequently used the analytical framework to examine the information that was used, the analysis, decision-making, communication and monitoring. The first recordings were analysed by multiple researchers to check if the framework produces reliable results. No qualitative data analysis software programs were used.



## 7.4. RESULTS

### 7.4.1. GENERAL OVERVIEW

Table 7.2 provides a general overview of the data. In total, 58 cases were selected in which an order was given. 41 orders were related to incident response (71%), 17 orders were related to safety (29%).

**Table 7.2:** General overview of the data

	BC1	BC2	BC3	BC4	BC5	BC6	BC7	BC8	BC9	TOTAL
Region	1	1	1	1	2	2	3	3	3	
<b>Number of incidents</b>	<b>16</b>	<b>4</b>	<b>8</b>	<b>7</b>	<b>6</b>	<b>1</b>	<b>10</b>	<b>2</b>	<b>1</b>	<b>55</b>
fire-related	12	3	5	2	4	1	4		1	32
hazardous material related	1		1	3			4			9
heavy rescue	3	1	2	2	2		2	2		14
<b>Total minutes incident time</b>	<b>532</b>	<b>82</b>	<b>365</b>	<b>130</b>	<b>199</b>	<b>28</b>	<b>435</b>	<b>119</b>	<b>31</b>	<b>1921</b>
average	33.2 5	20.5	45.6 25	18.5 7	33.1 6	28	43.5	59.5	31	34.94
<b>Units on the scene (includes fire trucks, ladders, squads or scuba vehicles)</b>										
1-2	12	2	2	5	3		7	1		32
3-4	3	1	6	2	1	1	6	1	1	22
> 4	1	1	2				1			5
<b>Number of orders studied</b>	<b>19</b>	<b>2</b>	<b>23</b>	<b>2</b>	<b>4</b>	<b>0</b>	<b>5</b>	<b>3</b>	<b>0</b>	<b>58</b>
related to incident response	14	1	16	2	3		3	2		41
related to safety	5	1	7		1		2	1		17
Average per incident	1.2	0.5	2.8	0.3	0.6	0	0.5	1.5	0	1.05

On average, BCs issued 1 order per incident. In 51% of the incidents (n=28), however, no order was issued. The size of the incident (i.e. number of units at the scene) seems to be related to the number of orders issued. 45% of the orders (n=26) were given during three large-scale incidents (2x fires, 1x scuba rescue).

In the following sections, we will discuss the results according to the five primary incident command functions.

#### 7.4.2. FACTFINDING

In the majority of cases (see table 7.3), BCs responded reactively to the situation at hand (81%) and no additional questions were raised about the incident which was at the focal point of decision making (62%). In 71% of cases, BCs had direct visual line of sight of the situation at hand. Generally, BCs were confronted with information from the environment and that information induced a decision-making process which resulted in an order.

**Table 7.3: Factfinding**

<b>Factfinding</b>	<b>N</b>	<b>%</b>
Responding proactively	11	19
Responding reactively	47	81
<b>Total</b>	<b>58</b>	<b>100</b>
Asking for additional information	22	38
Not asking for additional information	36	62
<b>Total</b>	<b>58</b>	<b>100</b>
Having direct visual line of sight	41	71
No direct visual line of sight	17	29
<b>Total</b>	<b>58</b>	<b>100</b>

#### 7.4.3. ANALYSIS

In the majority of cases (n=42, 72%), no alternative solutions were discussed or proposed during the decision-making process. Very often the first option that was made explicit by the BC was also chosen. Combined with the finding that BCs reactively respond to the situation at hand, this might indicate a recognition-primed decision making process. Only in 16 cases (28%), were one or more alternatives proposed and discussed by the BC or CC.

#### 7.4.4. DECISION MAKING

Of all orders given (n=58), 71% was related to incident response and 29% to safety. In only 8 cases (14%) did the BC intervene and changed or cancelled an action already taken by CCs. Although we do not give a qualitative assessment of the interventions done and not done by BCs, we found some examples in which an intervention might have contributed to response effectiveness and safety. Such an example is a situation in which two scuba teams were assigned to search for a victim in a car in the lake. The BC heard that the second team tried to open the car door while the first team had already informed the BC that it was impossible to open the car and it would be preferable to hoist up the car using a crane. When a member of the first scuba team complained about this, the BC answered 'I let it go'. In 38 cases (65%), the solution to the problem was introduced by the BC. In 16 cases (28%) the course of action was provided by a CC. In the remaining 4 cases other people came up with the solution.

#### 7.4.5. COMMUNICATION

According to command and control literature, incident commanders should focus on communicating 'what' they want to be achieved rather than how it should be achieved. In our research, however, only 12% of the orders included a purpose (see table 7.4). In 34% of the cases no desired action was prescribed by the BC. A typical example (no.15) of an order without a prescribed action is the following: 'See what you can do, lend a helping hand. Inform me about the task you decide on.' But even if a certain action was prescribed, which was the case in 66%, the prescription itself was often imprecise. A typical example is a BC who orders two crew commanders 'to organise foam'. This action may sound obvious for crew commanders but can be interpreted in multiple ways (Is the foam already at the incident scene? What kind of foam should be used? Where should the hoses be aimed? When should extinguishing commence? etc.). In general, our results show that the orders given by BCs left a great deal of leeway for interpretation by subordinates which may limit the likelihood that orders would be implemented as expected by BCs.

In addition, we found that orders were often embedded in a comprehensive conversation in which the transmission of information is alternated with orders or points of attentions. This not only sometimes resulted in difficulty in identifying orders during data analysis, but it also likely affects the understanding of the order by subordinates and may explain why some orders were not carried out appropriately (see next section).

**Table 7.4: Given orders**

<b>Given orders</b>		
	N	%
Purpose was explicated	7	12
Purpose was not explicated	51	88
<b>Total</b>	<b>58</b>	<b>100</b>
Means or techniques prescribed	16	28
No means or techniques prescribed	42	72
<b>Total</b>	<b>58</b>	<b>100</b>
A certain action was prescribed	38	66
No certain action was prescribed	20	34
<b>Total</b>	<b>58</b>	<b>100</b>
Purpose of prescribed action was explained	38	66
Purpose of prescribed action was not explained	20	34
<b>Total</b>	<b>58</b>	<b>100</b>
Intended recipient was clarified	45	78
Intended recipient was not clarified	13	22
<b>Total</b>	<b>58</b>	<b>100</b>

In addition to issuing orders, BCs also influenced frontline work in a more indirect manner by raising questions and making statements about the incident response (table 7.5). Although we did not systematically analyse situations in which questions or statements influenced decision-making by subordinates, we found that this way of influencing frontline operations was not always used deliberately; indeed, BCs were sometimes surprised that crew commanders initiated certain actions after a question or statement had been made. These actions were not always in accordance with the BCs intention as can be seen in the table below.

**Table 7.5: Influencing frontline work by raising questions or making statements**

<b>Influencing frontline work by raising questions or making statements</b>	
<b>Question or statement by BC</b>	<b>Consequence</b>
'Why is traffic still running here?'	Police officer walks off and shuts down the street.
'This is our contact person in the hotel. He might have inhaled some smoke. He/she (name) has sent in a crew hasn't he/she (...) So the hotel hasn't been evacuated yet?'	After the question, the crew commander walks away and evacuates the hotel., Later, however, the BC says that he did not want to evacuate the hotel but only wanted to know if there was smoke in the hotel.
'I agree, the ladder is too close to the	Although the BC explicitly states that the

fire. So...yes you're right. But I'm not sure if we can keep back the fire there.'	ladder is located too close to the fire, it is not removed or replaced.
'How about a thermal camera? Have we checked the environment yet with a thermal camera? Could that be an option?'	Crew commander gets the thermal camera and searches the environment for possible casualties.
'I just spoke with our chemical advisor and he advises using chemical boots, gloves and breathing apparatus. I just asked for an additional engine as we have to decontaminate because of the powder.'	When the BC arrives at the scene, the staff are waiting for instructions, nothing had happened at the downwind area and the victim has not yet been decontaminated.

#### 7.4.6. MONITORING

Not a single BC checked whether his or her order had been properly understood by subordinates. In 23 cases (40%), BCs checked if their order had been carried out by monitoring or raising questions about the execution of the order. No monitoring took place in 33 cases (57%). In 2 cases, no statements could be made about execution, as the recording finished before execution took place.

To examine if orders which are monitored are more likely to be carried out, we calculated a Cramer's V correlation. The calculation, however, uncovered no statistically significant relation between orders that were monitored and execution. Consequently, monitoring the execution of orders as defined in our research (observing and raising questions about task execution) does not ensure that orders are carried out as intended. In some cases, we found that battalion chiefs noticed that an order was not properly carried out but they did not intervene. An illustrative example is a BC who orders an arriving ladder truck to protect adjacent structures, but does not intervene when he sees how the fire is being extinguished. There are various possible explanations. There seems to be a difference between observing operations at the incident scene and deliberately analysing the response. Another possibility is that BCs do not intervene when orders fail to be carried out because they agree that a different solution might be better. A typical example is an order given by the BC to an arriving ladder truck to remain on stand-by until further notice. A few seconds later, however, a crew commander orders the ladder truck to take up a position in the front of the building to create an escape route. The BC is somewhat surprised by the order issued by the crew commander but does not intervene and says only 'Be careful'. Another explanation is that BCs are simply not very happy to intervene. A few seconds after a

battalion chief warned crew commanders to 'remember the helmets', a fire investigator arrived at the scene not wearing a helmet. The fact that the fire investigator was an immediate colleague of the BC, might explain why the BC did not comment on the absence of a helmet.

#### 7.4.7. RESULTS

In 20 cases (34%), we were able to conclude that the order was carried out in accordance with the order given by the BC. In 12 cases (21%), we find the opposite and conclude that the order was not executed appropriately. In 26 cases (45%), we were unable to draw conclusions about execution. More specifically: in 18 cases it was impossible to check if the order had been carried out appropriately based on the helmet-camera recordings. In 8 cases we were unable to comment on the execution due to the indecisive formulation of the order which was more often a point for consideration than a prescription of what to do ('Remember your helmet' as opposed to 'Wear a helmet when walking behind the lines').

In general, we observed three different types of deviations. The first type is related to orders which include an instruction which contradicts routine behaviour. In other words, instructions which require crew commanders to operate in a way they are not used to. An example is a situation in which a BC is confronted with two firefighters emerging from an industrial building, despite the fact that the BC had ordered the crew commanders to stay outside and not enter the building. Another example is a ladder truck firm which uses their canon to blow water into the fire although they were ordered to protect the adjacent building. The second type is related to orders which provide the conditions under which the order should be executed, but where one or more conditions are not met. An example is a crew of firefighters who did not wear their breathing apparatus although they had been ordered to do so. The third type is related to orders which prescribe how a particular problem should be solved, but the crew commander decides to use a different approach. An example is a situation in which a crew commander informed the BC that he attached the railing on the balcony, although the BC had ordered him to remove it. It should be noted, however, that not executing an order is not necessarily related to negative outcomes, but we have indeed seen examples in the data of orders which were not carried out and which lead to near miss incidents. For example, two crew commanders deviated from an order and entered an underground high power facility to extinguish a small fire, though the electricity had not yet been switched off. An evaluation of the incident revealed that the crew commanders had been very close to electrocution.

In addition, we observed situations in which crew commanders carried out orders as intended by the BC, but subsequently, possibly due to the absence of a follow-up assignment, took the initiative and started actions they deemed necessary. These actions, however, were not always carried out in consultation with the BC and could interfere with other decisions made at the incident site. A typical example was a large-scale fire in an industrial building. The BC ordered a harbour boat to serve as water supplier. After the order was carried out, the harbour boat activated its water canon in order to blow water on the roof of the building. At the same time, however, a crew of firefighters was present on the roof of the structure which created a hazardous situation.

## **7.5. REFLECTIONS ON FADCM ASPECTS**

Generally, when examining the command and control of battalion chiefs, a picture emerges of BCs who respond reactively and often intuitively (recognition-primed decision making) to the situation at hand, rarely halt or change a previously chosen manner of response, often communicate without explicating the intent of the order and, in the majority of cases, do not monitor the execution of the order. In at least 21% of the orders given, we were able to conclude that subordinates did not properly carry out the order. We conclude, therefore, that incident commanders were indeed able to influence operations at the frontline, but were generally not in control over what happened at the frontline.

### **7.5.1. FACTFINDING**

The video recordings show that the battalion chiefs primarily responded reactively to information from the environment (81%). Rarely battalion chiefs proactively gathered information. This finding seems to be in line with previous research conducted by Rake & Nja (2009), who also concluded that incident commanders primarily were reactive information consumers.

An explanation for this finding may be the large amount of sensory stimuli in the environment in which frontline commanders often have to operate. As frontline commanders need to make sense of this environment, which necessitates a lot mental effort (Weick, 1993), little mental capacity may be left to find out what information they need to know and how to obtain this information. Interestingly, most participants in the study were experienced decision makers. In NDM literature it is suggested that compared to novices, experienced decision makers are better able to distin-

guish relevant from irrelevant information (Klein, 2008). Although in this study no statements can be made about the distinction between experienced and inexperienced battalion chiefs, it seems that even experienced battalion chiefs are more directed by the information they receive than they seek.

#### 7.5.2. ANALYSIS

The video recordings show that in the majority of cases, battalion chiefs immediately took a decision after finding or receiving a bit of information. This suggests recognition primed decision making instead of rational decision making (Kahneman & Klein, 2009). In the study we found empirical support for the theoretical notion that recognition-primed decision making can be an inadequate way of decision making for BCs (see also Chapter 2). An example in our research is a fragment in which a manager of a hotel indicates that it might be wise to close the windows and doors before the fire service starts ventilation operations in the basement. The BC agrees and orders the hotel manager to enter the hotel and close all doors and windows above the basement. A few seconds later a crew commander noted that it might be better that he himself closed the doors and windows, since there was still an unsafe concentration of toxic fumes in and above the basement. The BC immediately asked the hotel manager to stay outside the building and approved the suggestion of the crew commander, stating that he thought that concentration toxic fumes were too high only in the basement.

#### 7.5.3. DECISION MAKING

In line with current literature on incident command and control (Rake & Nja, 2009), we found that BCs are incremental problem solvers who issue very few orders: in the majority of incidents (51%) no order was issued at all. 45% of the orders studied were issued in 5% of the incidents studied. 71% of the orders was related to incident response en 29% to safety. The majority of orders was provided during major incidents. The video recordings suggest that battalion chiefs rarely issued orders that deviate from decisions taken earlier by crew commanders.

Our finding supports the notion that large-scale incidents differ fundamentally from smaller incidents (Oomes, 2006). As Oomes (ibid) reiterated, 'not much about fighting big fires can be learned by fighting small ones'. Our research offers one explanation why not much about big fires can be learned from fighting smaller ones, i.e. the number of orders. That is not to say that large fires *always* differ from smaller ones as regards number of orders that were issued, but it seems that especially in cases



where new units arrive at the scene once the BC has already taken charge, more orders are issued.

#### 7.5.4. COMMUNICATION

Based on the video recordings, it can be concluded that the formulation of most orders did not comply with theory on well formulated orders. However, we were unable to conclude whether the manner of communication affects the execution of orders as desired by BCs. We are, therefore, unable to support findings from previous research in the military (Shattuck & Woods, 2000; Woods & Shattuck, 2000). Shattuck (2000) for instance argued that for commanders in the military *'it is not enough to tell subordinates what to do and why. When situations permit, commanders should explain how they arrived at the decision. Explaining the rationale helps subordinates understand and develop similar patterns of thought. Frequent interaction, formal and informal, professional and social, will provide subordinates additional opportunities to learn how their commanders think.'* In our research, however, it seems that subordinates in most cases know well what to do even when orders are poorly formulated. This suggests that in the majority of cases orders are concerned with tasks or conditions that are obvious to frontline workers. However, in the cases that tasks are less obvious or frontline workers do not experience the need to work according to certain rules or procedures, poorly formulated orders are likely to be poorly implemented.

#### 7.5.5. MONITORING

The video recordings show that no single battalion chiefs checked whether an order was appropriately understood by a crew commander. In the majority of cases (57%), the battalion chiefs did not monitor the execution of orders. 21% of all given orders was not implemented as it was ordered by the battalion chiefs. No correlation was found between the monitoring of orders and their implementation. Consequently, it seems that the degree to which frontline workers carry out orders from above is affected by myriad of variables, of which the monitoring effort of battalion chiefs may be just one.

## 7.6. METHODOLOGICAL REFLECTION

### 7.6.1. METHODOLOGICAL ASSESSMENT OF RESEARCH FINDINGS

**Table 7.6:** Methodological assessment

<b>External reliability</b>	External reliability is high since video-recordings enable other researchers to reanalyze battalion chiefs' incident command and control.
<b>Internal reliability</b>	Although the video recordings were analyzed by one researcher, it seems important to examine the inter-rater reliability by two or more researchers. In this study, initially two researchers used the analytical framework to examine whether the video-recordings were analyzed in the same way. This revealed some differences in interpretation after which the analytical framework has been slightly changed.
<b>Measurement validity</b>	-
<b>Internal validity</b>	-
<b>External validity</b>	The data is derived from only 9 BCs (from which 3 provided the most data) working in 4 regional fire services in the Netherlands. Although BCs in the Netherlands follow the same education (National Fire Academy), the participating BCs may not be prototypical to their regional fire service or the fire service in general. In addition, we are aware that a self-selection bias could be in play since a) BCs voluntarily cooperate in our research and b) BCs were able to determine which video recordings they would share with us. In conjunction with the first limitation, this bias makes it difficult to generalize our findings.
<b>Ecological validity</b>	Generally, the ecological validity of helmet-mounted cameras is good since video-recordings directly capture the environment in which command and control is performed. In some cases, the video-recordings did not commence at the beginning of the operation at the incident site but halfway through. This might have influenced our results, especially in regard to the number of orders

	given and their execution.
<b>Triangulation</b>	Triangulation of results generates complementation. The analysis of the video recordings yielded findings in line with the very limited existing research on incident command and control (e.g. Rake & Nja, 2009). The interviews uncovered that sometimes battalion chiefs have a different perception of the response compared to the video recordings. Participant observation gives the impression that the video recordings are representative for the incidents experienced by the battalion chiefs and the way they behave in practice.
<b>Opinion of participants</b>	Overall, the battalion chiefs were positive about the usage of helmet-mounted cameras during real incidents, as it provided them with the opportunity to get direct feedback.

#### 7.6.2. COMMENTS ON THE APPROPRIATENESS OF THE RESEARCH METHODS USED

As described above, the usage of helmet-mounted cameras as primary data collection method during real incidents suffers from some limitations. Nonetheless, helmet cameras provide probably the most accurate description of what frontline commanders do when in command (see also Omodei et al. 1997). A major finding of the study is that research primarily based on retrospective accounts of incident commanders is unlikely to provide a very accurate description of who did what and when. During the interviews, we discovered that battalion chiefs make sense of the past by organizing bits of memories in the form of a coherent story of what logically should have happened, not particularly what actually happened. For instance, one participating battalion chief, reporting about a large fire in the compartment of a garbage truck in the inner city of Amsterdam, told us that he had decided to call for an additional fire engine equipped with special foam. When he arrived on scene, he told us that he saw it would be hard to reach the fire, so he invented an alternative solution: he suggested towing the garbage truck to an industrial site where the truck could be disassembled to better reach the fire. However, the video recording showed us that after the battalion chiefs arrived at the scene of the event, it was other firefighters who came up with the idea to tow away the garbage truck. In reality, the battalion chief waited at least ten minutes for the fire engine with special foam to arrive before he changed his mind and decided to tow away the truck. Therefore, in line with previous research

(e.g. Omodei et al. 2002), the conclusion is that a helmet camera is appropriate primary research method for gaining insight into the daily practice of battalion chiefs.



## Chapter 8. Conclusions

### 8.1. INTRODUCTION

This chapter brings together the findings of the five studies and provides an answer to the research questions of this thesis.

### 8.2. ON FRONTLINE COMMAND

Till date, frontline command and incident command and control have been investigated to a very limited extent. This thesis attempted to provide a preliminary insight into frontline command and incident command and control in general and particularly the degree to which it can be studied. The first sub-question of this thesis was ‘what is frontline command?’ Frontline command is the direct supervision of frontline workers by a frontline commander. More specifically, frontline command can be defined as making decisions in the frontline and ensuring that frontline workers carry out these decisions. Frontline command under high levels of time-pressure, such as in emergency situations, is also known as (incident) command and control. Based on a literature review, this thesis identified five elements of frontline command: factfinding, analysis, decision making, communication and monitoring (FADCM).

### 8.3. PERFORMANCE, EXPLANATIONS AND POSSIBLE CONSEQUENCES

The **second sub-question** of this thesis was ‘how do frontline commanders in major criminal investigations and the response organization of the fire service perform, how can this performance be explained and what are the possible consequences?’ This question will be answered for each FADCM element.

#### 8.3.1. THE ASPECT ‘FACTFINDING’

With regard to factfinding, this thesis contributes to the current literature in two ways.

First, the studies suggest that information that frontline commanders *receive* from their environment plays a significant role in their decision making process. It turns out that frontline commanders in the studies mainly acted on information that they (accidentally) received. It seems that frontline commanders were compelled to use the

information that was provided by frontline workers. Often, frontline commanders blindly trusted and heavily relied on the information provided by frontline workers. Proactive information gathering by frontline commanders was rarely observed.

A possible explanation for this finding may be the information-rich environment in which frontline commanders have to operate. As frontline commanders are confronted with many sensory stimuli, all available mental capacity may be necessitated to process the incoming information. Consequently, no mental capacity is left for analyzing and gathering the information that is really needed. In the literature, this phenomenon is known as information overload. Klein (2009: 134) defined this phenomenon as *'the point at which our attempts to resolve uncertainty by getting more information become counterproductive'*. Sutcliffe and Weick (cited in Klein, 2009: 134) argued that *'information overload reduces our ability to take a good perspective on events, or to identify which cues are the most relevant, because we get so distracted by all the other irrelevant cues.'* According to the literature, information overload seems to be a typical problem of incident command. Omodei et al. (2005) for instance concluded in their study that commanders had trouble managing excessive data. Commanders attempted to use everything available, working harder to review more data than to integrate the data they had. This thesis suggests that the large amount of information in the environment causes information overload, which in turn may be responsible for the reactive response to information in the environment.

But there are more possible explanations for the reliance on information provided by the environment. Another explanation is that frontline commanders simply do not have the knowledge and experience to know what information is needed in particular situations. In addition, a rule of thumb that frontline commanders implicitly may use is that information from frontline workers is often relevant and reliable and, consequently, should be used in the decision making process. The findings suggest that frontline commanders are not always aware of their opportunities to devote attention to other aspects in the environment than frontline workers normally would do.

Based on NDM literature, it can be assumed that the way frontline commanders handle information usually results in satisfactory decisions. In NDM literature, it is suggested that heuristics (i.e. rules of thumb) are often useful for making decisions. However, heuristics that are not properly used might engender biases. In a minority of cases, frontline commanders' reliance on information provided by the environment may result in suboptimal decisions (see also Chapter 2). As frontline workers' decision

making might be susceptible to biases and errors (see Chapter 1 and 2), frontline commanders should be able to proactively search the environment to identify threats that frontline workers are unlikely to notice. This requires that frontline commanders make sure that they use their mental capacity as efficient as possible and not become distracted by all sensory stimuli in the environment.

In literature, there are indications that keeping some distance from the direct task execution may help to maintain protected from the large amount of sensory stimuli (see Chapter 2). Hypothetically, when not being exposed to the large amount of sensory stimuli, more time and capacity may be left for deliberately seeking information. However, very few empirical investigations have been undertaken to examine the effect of keeping distance and similar tools aimed at shielding the decision maker from the environment.

Second, a contribution of this thesis to the current literature is the identification of a new NDM mechanism. When frontline commanders receive a lot of information about something, than they are likely to devote more attention to that something, irrespective of the relevance of the initial information. When little information is provided to frontline commanders, it seems unlikely that this information gives rise to further search. This finding is in accordance with existing NDM research (e.g. Omodei et al. 2005; Klein, 2009), but does not yet seem to have been described as such. We have called it the 'information impulsion fallacy'. Interestingly, this mechanism is unlikely to be caused by information overload, since it was discovered in a serious game (Chapter 3) in which the amount of information provided to participants was not extremely high. However, the mechanism is likely to enforce information overload.

A plausible explanation for the information impulsion fallacy is the fear of making erroneous decisions. This is emphasized in the literature on cognitive closure. Ask & Granhag (2005), in a study on forensic decision making, defined cognitive closure as the desire for a clear-cut opinion on a judgmental topic, and an avoidance of confusion and ambiguity. According to Webster & Kruglanski (1997: 136), under certain circumstances closure may appear detrimental due to concerns about judgmental errors. The authors stated that *'heightened need to avoid closure and an accompanying desire to suspend judgment may often arise when concerns about decision accuracy are high or when judgmental flexibility is subjectively important to the individual.'* Related to cognitive closure is the finding that decision makers attempt to cope with



uncertainties in the decision making process by using and gathering more information (Lipshitz et al. 2007).

The information impulsion fallacy may result in inefficient use of resource capacity (e.g. Groenendaal & Helsloot, 2014). For instance, in major criminal investigations, devoting research capacity to forensic evidence that is not directly needed for the prosecution process implies that this research capacity cannot be used for other criminal investigations. Additionally, the drive to know more about salient information may also cause decision makers to overlook more important but less salient information. The result may be that suspects are found relatively late. In addition, as the information impulsion fallacy is likely to contribute to information overload, it may also indirectly be responsible for decision making errors (cf. Klein, 2009).

**Table 8.1:** Summary of the FADCM aspect factfinding

<b>Summary</b>	
<i>Overall finding</i>	The studies suggest that information that frontline commanders receive from their environment plays a significant role in the decision making process. It turns out that frontline commanders in the studies mainly acted on information that they (accidentally) received. It seems that when frontline workers provide information to frontline commanders, frontline commanders are compelled to use it. Often, frontline commanders blindly trust and heavily rely on the information provided by frontline workers. To conclude, it appears that in most cases, frontline commanders responded reactively to their environment. Proactive information gathering by frontline commanders was rarely observed. A contribution to current literature is the identification of a new NDM mechanism called 'information impulsion fallacy' which suggests that when frontline commanders receive a lot of information about something, they are likely to devote more attention to that particular something. When little information is provided to frontline commanders, than it seems unlikely that this information gives rise to further search.
<i>Possible explanations</i>	A possible explanation may be the richness of sensory stimuli frontline commanders feel obliged to respond to, making it hard for them to search proactively for information in the environ-

	ment. Another explanation may be that frontline commanders lack the experience to know what information they need to have. A rule of thumb that frontline commanders implicitly may use is that information from frontline workers is often relevant and reliable and therefore should be used.
<i>What are the possible consequences?</i>	In most cases, the way frontline commanders deal with information seems to result in satisfactory decisions. However, as frontline workers' decision making might be susceptible to biases and errors (see Chapter 1 and 2), frontline commanders should be able to proactively search the environment to identify threats that frontline workers are unlikely to notice. This requires that frontline commanders make sure that they use their mental capacity as efficient as possible and not become distracted by all sensory stimuli in the environment. The information impulsion fallacy may result in the inefficient use of research capacity and is likely to enforce information overload.

### 8.3.2. THE ASPECT 'ANALYSIS'

The studies give the impression that frontline commanders mostly make use of intuitive or recognition-primed decision making strategies, hence without deliberately considering decision alternatives or discussion. Assumptions are rarely made explicit. This finding is in line with a large amount of research which suggests that frontline commanders primarily use their intuitive decision skills when operating at the front-line (e.g. Klein et al. 1986; Klein, 2009; Kahneman & Klein, 2009; Brugghe-mans & Marynissen, 2013; Tissington, 2001; 2004). However, contrary to previous research, the evidence is not primarily based on retrospective accounts of incident commanders.

In addition, it also appears that NDM mechanisms such as stereotypes and emotions affect the analysis in the decision making process. The frontline commanders were often unaware of this influence in their decision making. This finding supports the current literature about the forensic confirmation bias. This literature suggests that individual's preexisting beliefs, expectations, motives and situational context influence the collection, perception and interpretation of evidence during the course of a criminal case (e.g. Kassin et al. 2013). The contribution of this thesis is that this bias is observed during the play of a serious game, which seems to be much closer to reality than the experimental studies that were used before.

A plausible explanation may be that in accordance with the recognition-primed decision making theory, the fast, intuitive way of decision making often leads to satisfactory results (Klein et al. 1986; Klein, 2009). According to literature (e.g. Kahneman & Klein, 2009), most decisions that people make are based on RPD, which occurs automatically, involuntary and almost effortlessly. In contrast, deliberate activities such as mental simulation are controlled, voluntary and effortful. They impose demands on limited attentional resources. It may be the case that in most cases, rational decision making such as mental simulation is not required for satisfactory decisions.

Omodei et al. (2005) provide another reasonable explanation. Due to a perception of pressure, decision makers are inclined to act based on what they see rather than using their analytical skills to assess the environment and compare decision alternatives. More specifically, Omodei et al. (2005: 39) provide four explanations for decision makers' tendency to act in pressing situations:

- A preference for errors of commission rather than omission. In most emergency situations, time is short, so there could very well be a general task bias for action over delay. According to the authors, there is some degree of self-protection in being able to identify clearly specified attempts to use resources, however unproductive such attempts might be;
- An illusory sense of greater control via activity. Schmitt and Klein (1996 cited by Omodei et al. 2005) argued that decision makers, to avoid subjective uncertainty, act in such a manner as to achieve an illusory sense of cognitive control over the environment. That is, activity regardless of its adequacy provides a sense that one is having some desirable effect in the problematic situation;
- An illusory sense of greater self-competence via activity. Doerner (1990 cited by Omodei et al. 2005) argued that decision makers act so as to guard against a sense of personal incompetence.
- An overestimation of personal ability. Omodei et al. (2005) suggest that decision makers may overestimate their personal ability with respect to both speed of information processing and amount of information that can be concurrently managed in working memory. Consequently, decision makers do not experience the need to engage a mental simulation process.

Finally and related to the last bullet, the explanation could be found in the education and training of frontline commanders. In current practice, it seems that in education and training of frontline commanders little attention is devoted to the influence of contextual factors and psychological biases and thus the need to activate mental simulation when making decisions.

But is there a problem? Yes and no. Recognition primed or intuitive decision making is a very powerful human decision making mechanism. In most cases, it results in satisfactory decisions (Klein et al. 1986). In exceptional cases, however, intuitive decision making may result in unsatisfactory decisions (see Chapter 2). When frontline commanders lack sufficient experience in practice, rules of thumb learned in education and training may be applied inappropriately. Notwithstanding the importance of improving intuitive decision making skills, it should be noticed that mostly frontline commanders will make a difference when they in contrast to frontline workers use a more rational decision making process, in the RPD model labeled as 'mental simulation' (Klein et al. 1986). This helps frontline commanders to find deviations in the environment that frontline workers are unlikely to see because they primarily use the fast, intuitive way of decision making.

**Table 8.2:** Summary of the FADCM aspect analysis

<b>Summary</b>	
<i>Overall finding</i>	The studies give the impression frontline commanders mostly make use of intuitive or recognition-primed decision making strategy, hence without deliberately considering decision alternatives or discussion. In addition, it also appears that NDM mechanisms such as stereotypes and emotions affect the analysis in the decision making process. The frontline commanders were often unaware of this influence in their decision making. This finding supports the current literature about the forensic confirmation bias. The contribution of this thesis is that this bias is observed during the playing of a serious game, which seems to be much closer to reality than the experimental studies that were used before.
<i>Possible explanations</i>	According to literature, most decisions that people make are based on RPD, which occurs automatically, involuntary and almost effortlessly. In contrast, deliberate activities such as mental simulation are controlled, voluntary and effortful. They impose demands on limited attentional resources. It may be the case that in most cases, rational decision making such as mental simulation is not required for satisfactory decisions. In addition, it seems that decision makers prefer action to thinking, especially when experiencing time-pressure. Finally, it seems that in education and training of frontline commanders little attention is devoted

	to the influence of contextual factors and psychological biases and thus the need to activate mental simulation when making decisions.
<i>What are the possible consequences?</i>	In exceptional cases, intuitive decision making may result in unsatisfactory decisions (see Chapter 2). When frontline commanders lack experience in practice, rules of thumb learned in education and training may be applied inappropriately.

### 8.3.3. THE ASPECT 'DECISION MAKING'

The overall findings suggest that frontline commanders seem to find it difficult to take fundamental decisions:

- In major criminal investigations, it seems that frontline commanders delay the decision making about who has done it to prevent the possibility of tunnel vision in the decision making process (referred to as 'open focus'). A possible explanation for the lack of focus may be the previously noted tendency to avoid cognitive closure when there is still a degree of ambiguity. This avoidance is likely to be driven by a fear of error in the decision making process. As also argued by others, this lack of focus could well be a far greater phenomenon and problem within criminal investigations than the risk of tunnel vision (cf. Snook & Cullen, 2008). Although the prevention of errors in major criminal investigation is important, there is also a need for efficient investigation work as a lot of crimes remain unsolved. Both are vital for the legitimacy of the criminal justice system. Currently it seems that frontline commanders are more concerned with preventing errors than increasing efficiency.
- In the organization of the fire response, it seems that most decisions are taken by frontline workers, not frontline commanders (it should be noticed that crew commanders are regarded here as frontline worker although they can be regarded as frontline commander as well). In addition, it appears that frontline commanders rarely take decisions that deviate from decisions earlier taken by frontline workers. A similar finding can be identified in major criminal investigations: when frontline commanders receive information from frontline workers about something, they seem to find it difficult to neglect it. Other put, they seem to find it difficult to assign resources to a possible perpetrator not prominently put forward by frontline workers. There are several possible explanations for the finding that frontline commanders are unlikely to deviate from decisions taken by frontline workers. It seems likely that in the majority of cases, frontline commanders

do not need to deviate from decisions taken by frontline workers. Additionally, taking divergent decisions seems to be rarely practiced in training environments. Consequently, frontline commanders gain very little experience with implementing decisions that interfere with frontline workers' decision making. Another explanation is conformity, i.e. frontline commanders' preference to prevent divergent decisions, because they want to keep support of frontline workers for their position as frontline commander. As Cialdini & Goldstein stress (2004: 598): *'Humans are fundamentally motivated to create and maintain meaningful social relationships with others. For example, implicit in the concept of injunctive norms is the idea that if we engage in behavior of which others approve, others will approve of us, too. Accordingly, we use approval and liking cues to help build, maintain and measure the intimacy of our relationships with others. We also move closer to achieving these affiliation-oriented goals when we abide by norms of social exchange with others, such as the norm of reciprocity.'* By reciprocity, the authors refer to the rule that *'obliges us to repay others for what we have received from them'*.

On the one hand, the findings diverge from current public administration research which emphasizes the importance of frontline management for organizational performance and effectiveness (e.g. Brewer, 2005; Johansen, 2012; Day & Winter, 2009, and more thoroughly Chapter 1). This thesis shows that frontline command may contribute to organizational performance, but only to a limited degree. The suggestion in the scholarly literature that direct supervision of task execution may significantly increase the likelihood that organizational policy is implemented (see Henderson & Pandey, 2013 for a discussion on this), can therefore not be supported. On the other hand, the findings provide support for scholars who have examined management in 'ordinary' organizations and refuted general believe that managers are most beneficial to organizational performance (e.g. Haslam et al. 2011; Mintzberg, 2009).

From a NDM perspective, it is likely that in the majority of cases the effectiveness and efficiency of the incident response is not dependent on the degree to which frontline commanders take fundamental decisions. However, especially in non-routine incidents frontline commanders must be able to take divergent decisions. In these particular cases, not taking fundamental decisions may result in an ineffective and inefficient response.

**Table 8.3:** Summary of the FADCM aspect decision making

<b>Summary</b>	
<i>Overall finding</i>	The overall findings suggest that frontline commanders seem to find it difficult to take fundamental decisions. In major criminal investigations, it seems that frontline commanders delay the decision making about who has done it to prevent the possibility of tunnel vision in the decision making process. In the organization of the fire response, it seems that most decisions are taken by frontline workers, not frontline commanders (it should be noticed that crew commanders are regarded here as frontline worker although they can be regarded as frontline commander as well). In addition, it appears that frontline commanders rarely take decisions that deviate from decisions earlier taken by frontline workers. A similar finding can be identified in major criminal investigations: when frontline commanders receive information from below the organization about something, they seem to find it difficult to neglect it. Conversely, they seem to find it difficult to assign resources to a possible perpetrator not prominently put forward by frontline workers.
<i>Possible explanations</i>	A possible explanation is that frontline commanders are more susceptible to preventing errors than improving the efficiency of frontline work. Moreover, taking divergent decisions in practice seems to be rare and it seems to be hardly addressed in training environments.
<i>What are the possible consequences?</i>	Not taking fundamental decisions or taking them to late may result in a loss of efficiency and effectiveness, especially in non-routine events.

#### 8.3.4. THE ASPECT 'COMMUNICATION'

The studies suggest that despite the often-inadequate formulation of orders, most orders seem to be implemented in a satisfactory manner. This may imply that in most cases, the questions of whether and how orders are executed depend on the knowledge and experience of frontline workers rather than the incident command and control of frontline commanders.

This finding may be explained by the concept of shared mental models. According to Mathieu et al. (2000), mental models are organized knowledge structures that allow individuals to interact with their environment. The authors state (2000: 274): *'Mental models allow people to predict and explain the behavior of the world around them, to recognize and remember relationships among components of the environment, and to construct expectations for what is likely to occur next. Furthermore, mental models allow people to draw inferences, make predictions, understand phenomena, decide which actions to take and experience events vicariously.'* In the literature on teams, it is suggested that teams can only coordinate their actions when they possess commonly held knowledge structures that allow them to predict team behavior based upon shared performance expectations (Fiore et al. 2001). The function of a shared mental model is to allow team members to draw on their own well-structured knowledge as a basis for selecting actions that are consistent and coordinated with those of their teammates (Mathieu et al. 2000). Although it is questionable whether frontline commanders and their workers can be regarded as team, the concept of shared mental model seems also applicable to frontline command (Stout et al. 1999).

According to Mathieu et al. (2000), there are different types of shared mental models. First, team members must understand the technology or equipment with which they are interacting. That is, they need to know the functioning of the equipment, the operating procedures, the system limitations and its likely failures. Second, team members must hold shared job or tasks models. According to Mathieu et al. (2000), such models describe and organize knowledge about how the task is accomplished in terms of procedures, task strategies, likely contingencies or problems and environmental conditions. Third, team members must hold shared conceptions of how the team interacts. This includes knowledge about roles and responsibilities of team members, understanding of interaction patterns and role interdependencies. Finally, team members must share a team member model. According to Mathieu et al. (2000), this model contains information that is specific to the member's teammates, their knowledge, skills, attitudes, preferences, strengths, weaknesses, tendencies, and so on.

Even when frontline workers receive poorly formulated orders from frontline commanders, it might be that they are well able to perform effectively because they have shared mental models. However, in exceptional cases frontline commanders or workers might have different mental models (see also Chapter 2). Consequently, in some cases a poorly formulated order may not be implemented in a satisfactory way. In



exceptional cases, this may have severe consequences with regard to response effectiveness and or frontline safety. In current practice, two problems can be identified. On the one hand, frontline workers seem to have little understanding why frontline commanders should make decisions which they consider to be unethical (but are likely to improve the response). On the other hand, frontline commanders do not seem to realize why they should make (and even focus on the) decisions that sometimes may be regarded as unethical by frontline workers.

**Table 8.4:** Summary of the FADCM aspect communication

<b>Summary</b>	
<i>Overall finding</i>	The studies suggest that despite the often inadequate formulation of orders, most orders seem to be implemented in a satisfactory manner. This implies that in most cases, the questions of whether and how orders are executed depend on the knowledge and experience of frontline workers rather than the incident command and control of frontline commanders.
<i>Possible explanations</i>	It seems that in most cases, frontline commanders and workers have a shared mental model about what needs to be done in particular situations. Consequently, there is often no need for a precise formulation of orders. An explanation for the often poorly formulated orders is the lack of attention to communication aspects in education and training.
<i>What are the possible consequences?</i>	Sometimes, a poorly formulated order will not be implemented in a satisfactory way. In exceptional cases, this may have severe consequences.

#### 8.3.5. THE ASPECT 'MONITORING'

The studies reveal that in the majority of cases frontline commanders do not monitor the implementation of orders. No relation was found between the degree to which orders are monitored and the degree to which they are implemented, most likely because battalion chiefs did not always intervene when orders were inappropriately carried out. In the literature, however, (direct) feedback on the execution of tasks has been found to be effective in improving performance in variety of situations (Goltz et al. 1990; Komaki et al. 1980; Komaki et al. 1982). Therefore, the findings of the two chapters on incident command and control do not suggest that monitoring is not effective, but rather that it is not done effectively in current practice.

Although most orders were implemented without monitoring effort of frontline commanders, the studies show that monitoring of orders is desirable to adjust the actions of frontline workers. Sometimes, it seems that orders are not always properly understood. In addition, as there are indications that frontline workers are unlikely to carry out decisions that they consider to be unethical, deliberate attention is required to check whether orders are implemented.

How can the lack of monitoring effort be explained? A typical NDM explanation is that in the majority of cases, a lack of monitoring does not have negative consequences. It seems that in current practice and in training environment, battalion chiefs receive little feedback about the degree to which they monitor the implementation of orders. Consequently, they rarely experience that a lack of monitoring may have adverse consequences in typical situations. Chapter 6 and 7 provide evidence for this explanation. A related explanation is that frontline commanders seem to have much confidence in the task maturity of frontline workers. Directed attention to the implementation of orders is therefore not considered to be necessary by frontline commanders.

That is not to say that implementation is unnecessary. As argued before, monitoring the implementation of orders might be necessary as it is likely that frontline workers face difficulties with implementing counter-intuitive decisions (see also Chapter 2). Additionally, as stated by Gibson (2000) and Brehmer (2005), decision makers in dynamic environments (such as frontline commanders in major criminal investigation or fire response, see e.g. Brehmer, 1992) learn poorly in environments where feedback about the outcomes of their actions is delayed. According to Gibson (2000), outcome feedback is delayed when at least some of the consequences of a decision makers' action are felt after the cause of the consequences is no longer observable in the environment. For instance, in the case of major fire operations, frontline workers rarely face the direct consequences of their extinguishing activities, such as producing contaminated water. Gibson (2000) suggests that by providing direct and timely feedback about task execution, decision makers are better able to learn the consequences of their actions. By monitoring the task execution, timely feedback can be provided.

Brehmer (1992) also studied feedback delays. He defined feedback delays as 'the information available at the moment of the decision which is not the information that the decision maker needs for the decision'. According to Brehmer (1992), there are different types of feedback delays in firefighting. The first type is dead time, which refers to the time required for the frontline commander's commands to start taking

effect. The second represents the time constant, namely the time required for the control action to change the state of the system. The third refers to the delay described by Gibson (2000) and others, that is a delay in the transmission of information about results. Although not explicitly described by Brehmer (1992), his work implies that frontline commanders need to monitor their issued orders to get a better understanding of the several types of feedback delay that are in play. This understanding may give rise to further action by frontline commanders, such as adjusting orders or highlighting the importance of certain conditions. For instance, when a frontline commander notices that his order to draw back is not carried out immediately, he could issue the order again.

**Table 8.5:** Summary of the FADCM aspect monitoring

<b>Summary</b>	
<i>Overall finding</i>	The studies show that the majority of orders are not monitored by frontline commanders. Although most orders were implemented without monitoring effort of frontline commanders, the studies show that monitoring of orders is desirable to adjust the actions of frontline workers.
<i>Possible explanations</i>	A typical NDM explanation is that in the majority of cases a lack of monitoring does not have negative consequences.
<i>What are the consequences?</i>	Especially in the case of counter-intuitive orders, it is likely that orders are not implemented as desired. This may have severe consequences with regard to response safety and effectiveness. Additionally, when not monitoring implementation of frontline tasks, frontline commanders are unable to provide direct feedback, which can be necessary for frontline workers to learn about their performance.

#### **8.4. ON RESEARCHING FRONTLINE COMMAND**

The third sub-question of this thesis was ‘what can be concluded from using various research methods about the degree to which frontline command and incident command and control can be studied?’

The principal methodological finding of this thesis is that the studies show that a single research method is insufficient to obtain an adequate understanding of the functioning of frontline commanders. Only by combining different research methods, not

necessarily a mix of qualitative and quantitative data collection instruments, richer and more reliable insight can be obtained about individual aspects and the effects of frontline command. More particularly, serious games, (participant) observation and the use of helmet cameras seem to be suitable methods for investigating different aspects of frontline command and incident command and control. Specifically with regard to serious games, this thesis shows that they can be based on realistic cases (e.g. solved crimes) involving realistic tasks (e.g. assigning tasks to frontline workers). This is contrary to previous research (see Chapter 1), in which participants had to make simple decisions based on hypothetical cases. Furthermore, this thesis shows that serious games can be played in the daily decision making environment of frontline commanders, not necessarily laboratory settings.

Another principal finding is that interviews and survey research do not seem to be suitable as primary research methods for the study of frontline command and incident command and control. It has been found that in some occasions frontline commanders have different perceptions about their performance than what appears from the video recordings from helmet-mounted cameras. This finding has also practical implications since many incident evaluations are primarily based on interviews. As perceptions of frontline commanders may be unreliable, incident investigators are recommended to use as many data sources as possible and compare the statements of frontline commanders with other interviews and data sources. With regard to survey research, it seems that the reliability of the findings is limited, as there may be countless biases into play that make that respondents will not answer the questions according to reality.

To conclude, it appears from this thesis that the effects frontline command are not easily revealed for researchers. A thorough understanding of frontline command necessitates study designs consisting of multiple research methods, which will make it time consuming and relatively expensive. Furthermore, cooperation from frontline organizations as well as frontline commanders is required in the development of and participation in the study. These barriers may explain why so little investigations have been conducted to such an interesting research field. Nonetheless, as is shown in this thesis, when having access to frontline organizations, it seems that there are ample opportunities to examine frontline command and incident command and control.

**Table 8.6:** Summary of the methodological findings

<b>Summary of methodological findings</b>	
<b>Interviews</b>	The interview as primary research method is inappropriate for getting a deep and reliable understanding of frontline command as well as incident command and control. It seems that respondents are unable to provide a reliable account of what happened due to several biases which distort their view on the past (see also Omodei et al. 2002). However, in conjunction with other research methods interviews provide insight into the reflections of frontline commanders.
<b>Serious games</b>	Although serious games only reflect some crucial aspects of the real decision making environment, they score relatively high on ecological validity compared to other research methods and consequently seem to be an effective method for investigating real world decision making (see also Gonzalez, 2012). This thesis shows that serious games are apt to create awareness among frontline commanders about NDM decision making mechanisms. Contrary to serious games which only simulates a few aspects of the daily decision making environment, this thesis shows that serious games can be based on a realistic case (e.g. a solved crime) and can be played within the daily decision making environment of frontline commanders.
<b>Survey</b>	As a primary research method, survey research seems to be inappropriate for investigating frontline command as well as incident command and control. As with interviews, several factors are into play which limit the validity and reliability of the findings.
<b>Observation</b>	Observation in a research environment enables researchers to get a decent understanding of frontline command. However, as the environment in which frontline commanders operate is hard to simulate, additional research methods are necessary to examine whether findings stand in the real world.

<b>Participant observation</b>	Participant observation seems to be one of the best ways to get a deep understanding of frontline command, but the results can hardly be generalized unless a lot of participant observations are conducted. This is possible, but intensive, time-consuming and expensive (cf. Bryman, 2012). In addition, the presence of the researcher at the frontline may influence both frontline commander and workers. Therefore this research method is particularly suited to examine the degree to which findings derived from laboratory settings apply in daily practice.
<b>Helmet mounted cameras</b>	Helmet mounted cameras have largely the same advantages and disadvantages as participant observation, however it is much less time-consuming. There are two specific disadvantages compared to participant observation. First, as the participant is able to determine which videos he or she wants to share and when to start the video recording, there may be a self-selection bias in play. Second, unlike participant observation, it is impossible to raise questions to frontline commanders and workers during their work (cf. Omodei et al. 1997; 2002).

## 8.5. THE EFFECTIVENESS OF FRONTLINE COMMAND

The central research question of this thesis was ‘how effective is frontline command in major criminal investigations and the response organization of the fire service?’ Based on the previous sub-questions, the following conclusion is drawn.

Frontline organizations, such as the section of the police organization concerned with major criminal investigation and the fire response organization, assume that frontline command and incident command and control are necessary under certain circumstances in order to effectively carry out frontline tasks. The results of this thesis suggest that the significance of frontline commanders to frontline tasks is far lower than frontline organizations think and consequently want us to believe. It has been found that decision making by frontline commanders is affected by various NDM mechanisms which can result in inefficient and ineffective decisions. In addition, frontline commanders are highly unlikely to make decisions which deviate from the routine behavior of frontline workers. Furthermore, the decisions made by frontline com-

manders are often poorly implemented, characterized by abstractly formulated orders and with little monitoring effort. Consequently, the assumption that in current practice frontline commanders contribute significantly to frontline work seems to be false.

## **Chapter 9. Implications**

### **9.1. INTRODUCTION**

In this final chapter, the implications of the findings are discussed. First, the general implications for frontline organizations are provided. Based on this, recommendations for frontline organizations concerned with major criminal investigation and fire response are discussed. Second, the implications of findings for Incident Command Systems (ICS) are given. Third, implications for future research are described.

### **9.2. IMPLICATIONS FOR FRONTLINE ORGANIZATIONS**

#### **9.2.1. GENERAL IMPLICATIONS**

Based on the different studies, it seems that frontline commanders are often unaware of the pitfalls in their decision making and the way they attempt to implement their decisions. The necessity of following the FADCM steps in the process of making and implementing decisions is poorly understood. Improved education and training on the basis of NDM insights, brought together in the FADCM model, may help raise awareness of the pitfalls of frontline command and incident command and control. It is vital that frontline commanders understand that they may indeed have to deviate from decisions which frontline workers regard as obvious in a particular situation; a requirement which is clearly a challenge as it cannot always be learned in a training environment. When actors in a training environment behave atypically, frontline commanders are likely to feel that the training environment is unrealistic and subsequently become less motivated to improve their skills.

An additional problem is that frontline workers neither welcome orders which deviate from normal practice, nor welcome greater involvement on the part of the frontline commander in their own decision-making. In general, there seems to be support for frontline commanders but only when they make decisions which are in line with decisions frontline workers themselves would make. That is, decisions which match frontline workers' personal beliefs, which are based primarily on their own perception of the incident environment. It seems that frontline workers do not always realize that as a result of various psychological factors frontline commanders may have a better overview of the incident environment and are therefore likely to opt for alternative



and often more appropriate decisions. Better education and training may enhance frontline workers' awareness of this aspect.

Although examination of operational practices showed frontline command and incident command and control to be apparently of minor significance, the question remains as to whether, and how, commanders at the frontline could have a more significant role.

There are plenty of situations, either conceptualized in theory or observed in practice, in which frontline commanders could make a difference by identifying and correcting decision making and implementation pitfalls within themselves and among subordinates. In other words, the frontline does not always operate optimally and frontline commanders could compensate for lesser quality at the frontline, a role which they presently carry out to only a limited extent.

In order to draw the greatest benefits from this theoretical added value, a new breed of frontline commanders is necessary who, among other things, should undergo rigorous training. Clearly an area of subsequent concern for frontline organizations would be how best to allocate their education and training budgets. Should they: a) invest in frontline commanders who are to make a difference only in exceptional situations, or b) invest in improving the skills and experience of frontline workers so that they are more often likely to perform optimally, and accept a 'failure' in exceptional situations?

If organizations opt to invest in better quality frontline commanders, at least two elements will require consideration.

First, the tasks and goals of frontline commanders will have to be defined. The thesis demonstrates that frontline commanders in major criminal investigations are constantly grappling with the tension between precaution (prevention of errors) and efficiency (optimal use of often scarce resources). The thesis further shows that frontline commanders in today's practice tend to opt for precaution, which has a negative impact on efficiency. The discussion which frontline organizations should therefore conduct with internal and external stakeholders should focus on striking a sound balance between precaution and efficacy. The result of this discussion should subsequently provide input for a clearly defined task description for frontline commanders.

Second, frontline organizations should ensure the presence of appropriate framework conditions to enable frontline commanders to operate adequately. This involves not only the organization of an intensive training program for frontline commanders aimed at increasing formal knowledge and incident command and control skills. Also, frontline commanders should be assigned a broad decision-making mandate during incident management or large-scale investigations. Senior management must support those decisions openly, post-incident. Further, the organization as a whole must be attuned to its frontline responders. This means, for example, that frontline commanders should be at a higher level in the hierarchy than the frontline workers they command during incidents or investigations. In addition, as Van Duin (2011) has previously noted, frontline organizations should reorganize their operational procedures in order to maximize frontline commanders' possibility to gain experience in real-life situations (e.g. by reducing the number of frontline commanders).

Finally, it should be emphasised that the insights from this thesis are not relevant only to police and fire services. In more general terms, we believe that every incident manager can benefit from the points of consideration we have listed throughout this thesis, such as 'consider the consequences carefully before making a decision', 'limit the work load' and 'monitor carefully the execution' (see for instance Chapter 2). It is important that managers who do not personally operate at the frontline (e.g. tactical or strategic decision makers) understand the limitations inherent to manageability of the frontline and the management capacity of frontline commanders. They should take into consideration the practicality of their decisions and seek advice from experts with frontline experience.

**Table 9.1:** Implications related to current body of knowledge

<b>Implications related to current body of knowledge</b>	
<b>New addition to the current body of knowledge</b>	In the NDM literature (e.g. Brehmer, 2000; 2005), different aspects of frontline decision making and policy implementation are described. A new addition to the current body of knowledge is a model in which these aspects are brought together. Based on this, it is assumed that frontline command can be improved in practice by devoting more attention to FADCM in education and training of frontline commanders. Another contribution to the current body of knowledge is the finding that mostly front-

	line commanders make a difference when they focus on other aspects than their subordinates would do. In the leadership literature, for instance, this aspect has not been described as such (Hannah et al. 2009).
<b>Supports current body of knowledge</b>	The insight that frontline commanders (in major criminal investigations) need to balance the tension between precaution (prevention of errors) and efficiency (optimal use of often scarce resources) has been described in previous research (e.g. Snook & Cullen, 2008), however it has not been identified as a principal task of frontline commanders. Additionally, the notion that the authority of frontline commanders during incidents seems to be largely dependent on their position in pre-incident situations has been more broadly described by authors as Dynes (1994) and Scholtens (2008). Dynes (1994; 1990) for instance noted that the functioning of the organizational structure and the behavior of workers during large-scale emergencies is largely dependent on the organizational structure and behavior before the emergency.
<b>Contrasts current body of knowledge</b>	-

#### 9.2.2. RECOMMENDATIONS FOR THE POLICE ORGANIZATION CONCERNED WITH MAJOR CRIMINAL INVESTIGATION

Based on the findings presented in the previous chapters, several recommendations to the police organization responsible for major criminal investigations can be provided.

##### *Give attention to NDM mechanisms in education and training*

According to this thesis, the Dutch police organization responsible for major criminal investigation seems to devote very little attention to NDM mechanisms in the decision making process. This thesis showed that serious games are apt to create awareness among frontline commanders in major criminal investigation about NDM mechanisms such as rules of thumb, own norms and values and the information impulsion fallacy. As it is presumed in the NDM literature that awareness about decision making biases may help decision makers to reduce these biases, it is recommended to give

more attention to NDM mechanisms in education in training of frontline commanders.

Generally, the NDM literature suggests that getting more experience (through education and training) in conjunction with critical reflection on experience (to become an expert, see for instance Grossman et al. 2013) may help to make a better use of rules of thumb in the daily operating environment (Salas et al. 2010; Kahneman & Klein, 2009; Pliske et al. 2001; Gibson, 2000). According to Pliske et al. (2001) and Zsombok & Klein (1997) decision making performance can be improved by using the following strategies: (a) engaging in deliberate practice, so that each opportunity for practice has a goal and evaluation criteria; (b) obtaining feedback that is accurate and diagnostic; (c) building mental models; (d) developing metacognitive skills, including the ability to select decision making models and to self-assess and adjust if necessary; and (e) becoming more mindful of opportunities for learning.

In addition, NDM theories provide a number of implications for how decision making training should be conducted. In order to accelerate learning, Pliske et al. (2001) and Zsombok & Klein (1997) recommend to make use of various learning tools:

- *Serious games*. According to Gonzalez (2012), one of the best ways to achieve successful training of frontline decision making is the use of serious games, which she calls decision making games. According to Gonzalez (2012), decision making games provide opportunities to learn decision makers about feedback delays, non linear relationships, interrelated decisions, novel events and unpredictable timing.
- *Decision making critique*. According to Pliske et al. (2001), the decision making critique facilitates thinking about what went well and not so well during an exercise. It can be used within the context of a serious game or an actual field training exercise. It consists of a series of questions designed to identify the difficult decisions made during the exercise. These questions explore important cues that might have been seen earlier, assessments that were mistaken, and the types of uncertainties encountered and how they were handled.
- *Decision requirements exercise*. According to Pliske et al. (2001), the decision requirements exercise is intended to help the participants 'unpack' the challenging questions they faced during a serious game or field exercise in order to maximize the amount of learning that occurs. Participants are asked questions to determine what types of information they considered and why these particular de-

cisions were so challenging. After performing this exercise, participants may have a better sense of the judgments and decisions facing them, why they are difficult and where people can go wrong in this type of situation.

- *PreMortem exercise.* This exercise can be used to identify key vulnerabilities in a plan. After someone has developed a plan, the group is told that by looking into a crystal ball it is determined that the plan failed. Individual group members then spend a few minutes independently writing down reasons why the plan failed. The facilitator then leads a discussion in which he or she elicits reasons from each group member until all concerns have been identified (Pliske et al. 2001).
- *Commander's intent exercise.* According to Pliske et al. (2001), This exercise provides an opportunity for the participants to practice their skills for communicating commander's intent (which is a leader's rationale underlying a particular order or plan of action). This exercise is administered in conjunction with a serious game. According to Pliske et al. (2001), participants describe their solutions to the serious game in the form of a set of orders to their subordinates and also provide a description of their intent. The facilitator then identifies a plausible, but unexpected event that will interfere with that plan and assigns participants to role-play the leader and his or her subordinates. The participant role-playing the leader then writes down how he or she expects all of the subordinates to react. At the same time, the participants role-playing the subordinates write down how they would actually react based on the intent provided by the leader. Next, the two interpretations are compared (Pliske et al. 2001).
- *Situation awareness calibration exercise.* This exercise is used to provide insight into how different team members perceive the same environment. According to Pliske et al. 2001, this exercise is ideally administered in conjunction with an actual training exercise, but can be used with a serious game too. The training exercise is stopped at some point (preferably at a point in time when some of the team members appear confused or stressed), and each team member is required to independently answer a brief questionnaire that attempts to capture his or her current situation awareness about exercise. The exercise continues and the facilitator uses the information from the questionnaires in the debriefing. According to Pliske et al. (2001), the debrief can focus on issues as the role and function of the individual team members, prediction of future events, and indicators that a plan is either succeeding or failing.

In addition to these learning tools, the NDM literature assumes that more attention to decision biases in practice can be obtained by making decision makers responsible for certain decision making pitfalls. For instance, in the aviation industry there is evidence that a high level of perceived accountability for certain biases is positively related with fewer errors (Mosier et al. 1998). In education, frontline commanders of the police could be made more aware of their specific role regarding the prevention of decision making biases, such as the information impulsion fallacy.

Furthermore, this thesis shows that training should not only be directed to frontline commanders but also to senior managers, for instance those responsible for directing Major Criminal Investigation Teams (MITs). As senior managers may be prone to the same NDM mechanisms, they should experience how these mechanisms operate in practice. In addition, by having a decent understanding of NDM mechanisms, senior managers are able to create an environment which reduces the possible negative effects of these mechanisms. For instance, senior managers may introduce a peer review process in which the reviewers (ideally from a different region) are asked to examine rules of thumb that are used by the commanders. Therefore, it is recommended to develop serious games specifically aimed at senior managers. Additionally, the senior management position should also be incorporated in the serious game developed for frontline commanders.

**Table 9.2:** Implications related to current body of knowledge

<b>Implications related to current body of knowledge</b>	
<b>New addition to the current body of knowledge</b>	New to the current body of knowledge is the notion that training and education about NDM mechanisms should not only be directed to frontline commanders, but also their senior managers.
<b>Supports current body of knowledge</b>	This thesis shows that serious games are (also) applicable in major criminal investigation to raise awareness about NDM mechanisms. However, contrary to previous research, this thesis shows that serious games can be based on a realistic case (e.g. an already solved crime) and can be conducted within the daily decision making environment of frontline commanders.
<b>Contrasts current body of knowledge</b>	-

### *Organize knowledge exchange*

This thesis shows that frontline commanders of different MITs used different rules of thumb in the analysis of the same information. Although this is not necessarily adverse, it may result in errors and inefficiency (e.g. research capacity is devoted to the wrong suspects for a long time). As it seems that rules of thumb are shaped by the environment in which frontline commanders operate, it is recommended to stimulate knowledge exchange between frontline commanders.

In the NDM literature, different strategies of knowledge exchange are discussed. Grossman et al. (2013) discuss the concept of cross-training, which according to the authors may help to improve decision making performance and implicit coordination among team members. The authors separate three different approaches of cross-training: positional clarification, positional modeling and positional rotation. Positional clarification involves learning about the roles of teammates through simple information exchange, while positional modeling incorporates actual models of members' task and duties (Grossman et al. 2013). The most involved approach, according to the authors, that is positional rotation, allows trainees to 'walk in each other's shoes' by actively engaging in the tasks and duties assigned to other teammates.

Another strategy discussed in NDM literature is the use of job rotation schemes. According to Burke & Miller (1999), job rotation or lateral career moves, exposes employees to numerous decision making scenarios and decision making styles which they can learn vicariously. Furthermore, job rotation may also help decision makers to quickly collect data about the organizations business and work practices (ibid).

Interestingly, in NDM literature job rotation schemes are commonly connected to the function and not the location in which the work has to be performed (see e.g. the review of Grossman et al. 2013). As this thesis observed differences between regional police forces, it is recommended to implement 'relocation schemes' which relocate frontline commanders from one region to another. This may enable frontline commanders to learn new rules of thumb and how to use them.

**Table 9.3:** Implications related to current body of knowledge

<b>Implications related to current body of knowledge</b>	
<b>New addition to the current body of knowledge</b>	This thesis shows that rules of thumb vary dependent on the environment in which frontline commanders operate. Therefore, it is recommended to introduce job rotation schemes. In the NDM literature, job rotation schemes are often defined as policies in which employees are exposed to different parts of the organization to sensitize them to different perspectives (e.g. Hogarth, 2008). In this thesis, however, it is also recommended to organize knowledge exchange by relocating frontline commanders from one region to another.
<b>Supports current body of knowledge</b>	In line with current NDM literature, it is recommended to encourage knowledge exchange by implementing cross training and job rotation schemes in which frontline commanders gain experience with several aspects of the criminal investigation process.
<b>Contrasts current body of knowledge</b>	-

*Be clear about the objective of frontline command*

Unlike most of the literature concerned with major criminal investigation (e.g. Tong et al. 2009), this thesis shows that the polarity between precaution (aimed at the prevention of wrongful convictions) and efficacy is rarely considered in major criminal investigation (see Chapter 5, but also Snook & Cullen, 2008; Groenendaal & Helsloot, 2014). In other words, precaution aimed at the prevention of wrongful convictions is often not conducive to the efficacy of the criminal justice system. For this reason, when measures are developed it is essential to determine the scope of the precaution problem to be resolved in relation to the efficacy to be resolved. The question is whether judicial flaws should be prevented whatever the cost, as this would mean that fewer criminals would be caught and prosecuted.

This thesis recommends the police organization responsible for major criminal investigation to be very clear about the objective of frontline command: are frontline commanders mainly responsible for precaution or efficacy? To answer this question, the police organization needs to decide what the right balance is between precaution



and efficacy. As this is also a political and societal discussion, the police organization is recommended to encourage a societal discussion about the balance between precaution and efficacy in major criminal investigation.

**Table 9.4:** Implications related to current body of knowledge

<b>Implications related to current body of knowledge</b>	
<b>New addition to the current body of knowledge</b>	In the current literature on major criminal investigation, the function of frontline command is not associated with the balance between precaution and efficacy. This thesis recommends police organizations to encourage a societal discussion about this balance, which should be input for the task description of frontline commanders in major criminal investigations.
<b>Supports current body of knowledge</b>	-
<b>Contrasts current body of knowledge</b>	-

### 9.2.3. RECOMMENDATIONS FOR THE INCIDENT RESPONSE ORGANIZATION OF THE FIRE SERVICE

Additionally, this thesis provides suggestions for improvement for the incident response organization of the fire service.

*Select frontline commanders who are less inclined to conform to group norms and values and are able to use their (highly developed) analytical skills under time-pressure;*

This thesis suggest that frontline commanders who are less inclined to conform to group norms and values perform are better performers on the frontline command position. It is recommended therefore to use 'dealing with social pressure' as one of the criteria for the selection of potential frontline commanders. That is, in the selection process of potential frontline commanders, an important selection criterion should be the degree to which a potential frontline commander tends to conform to the opinion, social norms and values of peers (e.g. subordinates). The more a candidate commander tends to conform to social norms, the less he or she is suited to be in a frontline commander's position. Other put, frontline commanders should not mind being disliked by frontline workers when taking unpopular decisions.

This recommendation contrasts current views on necessary incident command competencies. In a study on command competencies in the London Fire Service, Burke (1997: 275) stressed that ‘deciding’ is an important competency of incident command, which he defined as *‘the generation and evaluation of alternatives in order to maximize success/acceptability of outcomes, and/or to promote consensus among decision makers’*. In this definition of deciding, Burke (1997) presumes that frontline commanders should strive to acceptability and consensus. In this thesis, however, it is shown that frontline commanders should be prepared to do the opposite, that is taking decisions that may be not generally accepted.

In her seminal work on personality characteristics and competences of incident commanders, Flin (1996) identified three key personality characteristics of incident commanders: leadership ability, stable personality and decisive. According to Flin (1996: 42), the leadership ability includes trust, commands respect, acts with authority and impartiality, is diplomatic, minimizes potential conflict across a multidisciplinary team, is a good communicator, listen to others, shows integrity, directs and controls the efforts of others, takes charge confidently and completely even under pressure. Notably, she did not specifically identified incident commander’s ability to take unpopular decisions as personality characteristic of incident commanders.

Finally, frontline commanders should be selected by their ability to make an effective use of their analytical skills under high levels of time-pressure.

**Table 9.5:** Implications related to current body of knowledge

<b>Implications related to current body of knowledge</b>	
<b>New addition to the current body of knowledge</b>	The notion that particularly frontline commanders can make a difference by using their analytical skills during the incident response, is not emphasized in NDM models such as RPD.
<b>Supports current body of knowledge</b>	-
<b>Contrasts current body of knowledge</b>	The current body of knowledge suggests that supervisors should strive for acceptability of their decisions and consensus among decision makers. Opposing this view, this thesis recommends to select frontline commanders who

are less inclined to conform to group norms and values, and hence, willing to take unpopular decisions.

*Review the way in which frontline commanders are currently educated and trained;*

Based on this thesis and additional interviews with frontline commanders, it is concluded that in current practice little attention is devoted to the way frontline commanders are educated and trained. Particularly, it seems that significant insights from NDM research are not used in the development of curricula for frontline commanders.

First, little attention seems to be devoted in practice to insights related to the different FADCM aspects of frontline command. With regard to factfinding, for instance, the findings in this thesis suggest that frontline commanders (and particularly battalion chiefs and senior fire officers) should not have to have the same knowledge and experience as frontline workers. This recommendation contradicts current practice in which frontline commanders receive a large amount of basic firefighter skills. Based on this thesis, however, it seems better to give frontline commanders' the knowledge and experience to solve problems that frontline workers may not be able to. Furthermore, with regard to communication, in current training practice little attention is paid to implicit ways of influencing decision making by frontline workers. For instance, a tactic to replace a non-functioning crew is to give them a task which is less critical to the incident response. However, this kind of tactics are rarely educated and trained in current training practice. Additionally, the aspects communication and monitoring receive very little attention in current practice. Many battalion chiefs stressed that they rarely receive feedback about the formulation and monitoring of orders. Consequently, it is recommended to provide feedback to all FADCM aspects of frontline command.

Second, it seems that little attention is devoted in current training practice to metacognition. Metacognition is defined in NDM literature as '*individuals knowledge of the states and processes of their own mind and/or their ability to control or modify these states and processes*' (Cohen et al. 1996: 209). According to NDM literature (Cohen et al. 1996; Zsombok & Klein, 1997), expert decision makers appear to be better able to monitor their own processes during decision making. As Cannon-Bowers & Bell (1997) noted, experienced decision makers are superior to novices in understanding their own level of comprehension, and what is necessary to improve their state of

knowledge. This 'executive' function is crucial in guiding a decision maker, particularly as the problem changes and evolves, because it allows the decision maker to adapt his or her strategy as needed. Orasanu (1990: cited in Cannon-Bowers & Bell, 1997) maintained that effective metacognitive skills also allow decision makers to better manage resources because they have a more accurate picture of their own strengths and weaknesses, and of the nature of the problem (ibid).

According to Orasanu (2005), metacognition is one of the most trainable decision making related skills. According to her, decision makers can be learned when to assess the strengths and weaknesses of their own decision making. Furthermore, other people in the environment can be used to stimulate metacognitive processes of the decision maker (ibid). As Orasanu (2005) noted, devil's advocate and crystal ball techniques can be used to challenge assumptions and see weaknesses in situation assessments and plans. Therefore, it is recommended to train metacognitive skills of frontline commanders. More particularly, it is recommended to learn frontline commanders when and how they are able to switch between different decision making strategies (e.g. switching from intuitive decision making to mental simulation). Though not empirically validated in applied research, taking time to consider the effects of a potential decision and reducing workload may be two effective strategies which decision makers can use to support their metacognition capabilities (Kahneman, 2011).

Third, although largely based on studies conducted in laboratory settings, the NDM literature provides promising recommendations for improving the effectiveness of training and education. These recommendations are concerned with the way training is provided to frontline commanders and seem to be relatively unknown in current practice. Based on an extensive review, Gonzalez (2012) provided the following suggestions for improving education and training of dynamic decision makers:

- Slow is fast when it comes to adapting to time-constrained environments. Thus, individuals trained on a task at a slower pace are generally able to adapt more successfully to greater time constraints compared to those who only trained under high time constraints, regardless of exceedingly large number of practice sessions given to those training under time constraints.
- Low workload is better than high workload. Similar to the previous point, when workload is low decision makers are better able to understand the feedback from the environment. Other put, low workload are best during training for people to

perform well in fast and high-workload tasks. In current practice, however, front-line commanders are expected to take decisions under high levels of workload. For instance, frontline commanders are expected to make several decisions simultaneously and exchange information with various response units, while continuously assessing the environment for possible threats.

- Heterogeneity helps adaptation. According to Gonzalez (2012), the variation in the situations that people confront during training influences how fast and how well they learn to adapt to novel and unexpected situations with higher variation leading to better transfer.
- Feedforward ('learning by example') helps adaptation. According to Gonzalez (2012), knowledge of results is not enough for improving learning and adaptation. The provision of outcome feedback seems to be an inferior way of trying to aid learning and performance compared to the viewing of a highly skilled decision maker. However, in current practice, it seems that learning by doing is regarded as more important than learning by observing.

Along the same line, Hogarth (2008: 102) provides several recommendations for conducting decision making training. According to Hogarth, it is important to practice in many different environments: *'if people want to shape their intuitions, is to make conscious efforts to inhabit environments that expose them to the experiences and information that form the intuitions that they want.'* In addition, Hogarth calls for paying attention to feedback that is provided in the environment. As stressed before, in the environment of frontline commanders, feedback can be systematically delayed or missing. Hogarth stress that people should know whether one's intuitions have been gained in kind or wicked environments. Finally, Hogarth emphasis the importance of threatening 'emotions as data'. According to Hogarth, people should be made aware that the information transmitted by their emotions is just part of the data that should be considered (Hogarth, 2008).

In sum, based on NDM literature, it is recommended to (a) devote more attention in training and education to 'learning by example' strategies, (b) improve the way feedback is provided (e.g. by using helmet-mounted cameras or direct coaching) and (c) limit the pressure under which decision makers have to operate in training environments.

*(For frontline commanders): During the response, focus on a single aspect to which you can make a difference as frontline commander;*

This thesis suggests that frontline commanders are able to operate more effectively when they focus on only one aspect of the incident response at a time. More specifically, as a result of human factors and practical limitations, it seems that frontline commanders are able to control frontline work only to a very limited degree.

In the NDM literature, however, often the opposite is asserted (e.g. Burke, 1997). According to Flin (1996: 69), *‘the incident commander must be proficient in assessing the situation, implementing a plan of action according to operational procedures and monitoring the operation thereafter. He or she is responsible not only for the success of the operation, but also for the safety of all involved in the emergency.’* Furthermore, also practitioners tend to presume that frontline commanders should (be able to) perform several tasks at the same time (see Chapter 6 and 7).

This thesis recommends frontline commanders to stay focused. More specifically, frontline commanders should ask themselves where they can or should ‘make a difference’ during incidents and focus only on one or two aspects of the incident response. The following practical guidelines may help to bring this in effect when arriving at the scene of the event:

**Table 9.6:** Guidelines aimed at battalion chiefs when arriving on the scene

Practical guideline	Explanation
1. Maintain, in the first instance, spatial and mental distance from the direct task execution.	In NDM and psychology literature, there are indications that keeping some distance from the direct task execution may help to be protected from the large amount of sensory stimuli (see Chapter 2). When not being exposed to the sensory stimuli, more time and capacity may be left for deliberately seeking information.
2. From a distance, look for indications that action is required.	
3. Determine the broad outline of any indication you find to avoid the pitfall of	This thesis suggests that incident commanders can exercise control only to a

micromanagement. For instance, when frontline workers do not comply with safety procedures, consider ceasing activities until sufficient frontline commanders are at the frontline to monitor rule compliance.	limited degree. In addition, NDM and psychology literature suppose that high work load is detrimental to decision making performance.
4. Trust your intuition to determine at which moment a critical decision is required.	See also Chapter 2. Recognition-primed decision making suggests that in most cases, intuition can be trusted.
5. If you feel the need to act, ask yourself if this is the decision which will make a difference. Also consider whether you are able to monitor the implementation of the decision. Realize that you can make only a few decisions per incident because each order you issue requires careful communication and monitoring.	This thesis emphasizes the importance of completing the FADCM steps. Consequently, if a decision is taken, considerable attention should be devoted to the communication and monitoring of the decision.
6. Before making the decision, take time to think about the consequences of that decision. One consequence could be that for a considerable time you would be prevented from having a clear view on the incident resulting in the necessity for frontline management backup.	See also Chapter 2. In RPD, this is referred to as mental simulation. As frontline workers mostly use a fast, recognition-based decision making strategy, this thesis argues that frontline commanders make a difference when they take time to consider the consequences of the course of action.
7. Translate the decision into an order and communicate this to frontline workers. Explain why you have made the decision and ask an open question in order to check if the decision has been understood correctly.	This thesis shows that frontline commanders are often poorly communicators. In exceptional cases, this may have adverse consequences. Frontline commanders should therefore pay attention to the way they issue orders.
8. Monitor the execution of the issued order and adjust if necessary. In the event you cannot be physically present during the execution of an order, ask an open question to determine precisely what the	See above.

frontline workers have done. New indications may manifest which require a further decision.	
9. Monitoring is a specific task which requires concentration so it is unwise, as frontline commander, to take on additional tasks until execution of the critical decision is complete.	See above.

These key points have been used for some years (2010-2013) in training fire commanders to improve their frontline management skills. Crisislab, a research foundation associated with the Radboud University Nijmegen, is currently running a research programme into the effectiveness of these courses. Thus far, the results are looking positive: indeed, frontline commanders themselves feel they are more able to make 'a difference'. Moreover, frontline workers are very happy with the FADCM model adopted by their commanders whereby they are more autonomous in decision making. Some frontline workers now finally appreciate that frontline commanders are not merely 'extras', but that they provide an important contribution to incident management.

**Table 9.7:** Implications related to current body of knowledge

<b>Implications related to current body of knowledge</b>	
<b>New addition to the current body of knowledge</b>	As far as we are concerned, a set of guidelines as described in this thesis, based on NDM insights and particularly aimed at battalion chiefs, has not been described in NDM literature.
<b>Supports current body of knowledge</b>	-
<b>Contrasts current body of knowledge</b>	Both NDM literature and practitioners suggest that frontline commanders are or should be able to perform several tasks at the same time. Based on insights from NDM research and psychology, however, frontline commanders are recommended to focus on one aspect of the incident response in order to limit the adverse effects of high workload.



*(For senior management): Provide visible support to frontline commanders.*

This thesis suggests that frontline workers may not carry out orders which they consider to be inappropriate, strange (non-routine) or unprofessional. In the case that frontline workers do not implement issued orders, frontline commanders should have the authority to impose sanctions. However, imposing sanctions is only likely to work when frontline commanders receive visible support from senior management. Therefore, this thesis recommends senior managers to provide visible support to frontline commanders before and after the incident response. For instance, when an order of a frontline commander is not implemented, senior management should take organizational measures against the workers involved (e.g. suspension, reducing payment, etc.).

In the literature on incident command and control, it is commonly noted that frontline commanders should have the authority to impose decisions. However, the relation between the degree of authority and the influence of senior management is rarely discussed (e.g. Rake & Nja, 2009).

**Table 9.8:** Implications related to current body of knowledge

<b>Implications related to current body of knowledge</b>	
<b>New addition to the current body of knowledge</b>	In the current scientific literature on incident command and control, the significant role of senior management seems to be rarely considered. The notion that the authority of frontline commanders is also dependent on the degree to which they are likely to be supported by senior managers (especially when taking measures against frontline workers in the response phase) seems to be overlooked in the literature on incident command and control.
<b>Supports current body of knowledge</b>	-
<b>Contrasts current body of knowledge</b>	-

### 9.3. IMPLICATIONS FOR INCIDENT COMMAND SYSTEMS (ICS)<sup>7</sup>

The findings of this thesis contrast with assumptions in literature and practice about the functioning of Incident Command Systems (ICS) during crisis situations. ICS is an organizational structure that is supposed to ensure an effective inter- and intra-organizational response by temporarily centralizing the authority to direct members of multiple independent organizations (Bigley & Robert, 2001; Buck et al. 2006; Moynihan, 2009). In the Netherlands, the ICS has three levels of command: an operational level at the incident site (COPI), a tactical level (ROT) and a strategic level (BT/RBT). Incident Command Systems assume that (a) centralized, top-down coordination (referred to as centralized coordination) of frontline workers is needed to achieve smooth cooperation at the frontline and that (b) frontline commanders can bring this top-down coordination into effect (see Groenendaal et al. 2013 for a thorough review). However, this thesis suggests that frontline commanders are able to exercise control only to a limited degree. Therefore, alternatives to centralized coordination are desired.

This section presents an alternative approach to centralized coordination in which task-adjustment naturally emerges from the task at hand when frontline workers follow a few simple rules. In addition, two managerial intervention strategies already used by frontline commanders in practice are described. These strategies only may work in specific situations when frontline workers are likely to misinterpret the environment in which they operate.

#### 9.3.1. TASK-ADJUSTMENT THROUGH STIGMERGY

Stigmergy is a form of self-organizing, bottom-up coordination in which activities are neither centrally controlled nor locally supervised; it is generated by placing signs and modifying the environment (Bonabeau & Meyer, 2001). Grassé (1959), a French zoologist who studied animal sociology, first introduced the concept of stigmergy to explicate the mechanisms underlying the emergence, regulation and control of social insects. Grasse discovered that the activities of social insects were coordinated and regulated through indirect communication mediated by modifications of the envi-

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<sup>7</sup> This paragraph is based on: Groenendaal, J. Helsloot, I. & Scholtens, A. (2013). A Critical Examination of the Assumptions Regarding Centralized Coordination in Large-Scale Emergency Situations. *Journal of Homeland Security and Emergency Management*, 10(1), 113-135.

ronment, which was termed stigmergy (March & Onof, 2008). Theraulaz and Bonabeau (1999: 111) described the basic principle of stigmergy more simply as *'Traces left and modifications made by individuals in their environment and may feed back on them.'*

Stigmergy in social insects is illustrated by the food foraging of ants (Valckenaers et al. 2006). In the absence of environmental signals, ants randomly search for food. When an ant discovers a food source, it deposits an odorant pheromone as it returns to the nest with some of the food, generating a pheromone trail between the nest and the food source that will evaporate if no other ants deposit fresh pheromones. When another ant senses a pheromone trail, its instincts will lead it to follow the trail to the food source. When it locates the food source, it deposits more pheromone to maintain and strengthen the pheromone trail. When the food source is exhausted, the ants return to a randomized search for food, and the trail evaporates (Valckenaers et al. 2006).

Valckenaers et al. (2006) identified three distinguishing characteristics of stigmergy. First, patterns of self-organization are generated without the need for direct communication between organizational members, which is significant because poor communication between frontline responders is almost inevitable in emergency situations. Second, the environment shields the decision maker from the complexity of the environment because global information is locally available and a complete operational 'picture' is not required before units can perform a task. Finally, the information is accurate because its lifetime is limited and refreshed only as long as it remains valid, which allows the recognition-primed decision-making behavior of emergency responders to be efficient and effective.

A practical example of stigmergy is illustrated by the 2001 Fireworks disaster in the Netherlands. After the explosion, which destroyed more than 1000 residential buildings, firefighters and other rescue workers searched the buildings for possible casualties. The emergency responders agreed to place colored signs on the doors of buildings that had previously been searched for victims. By using a simple rule (*'when a sign is painted on the door, I will take the next one'*), emergency responders were able to search buildings effectively and efficiently without any central supervision. In this example, coordination followed from the task itself rather than from emergency managers' coordination activities. Interestingly, although this procedure has been adopted by Urban Search and Rescue Teams (USAR), the firefighters devised this pro-

cedure independently in the Fireworks disaster. Berlin & Carlstrom (2008) provided another example of stigmergy by describing how various 'signals' initially placed in the environment influenced the decisions made by frontline responders: *'The choice of points of entry, command centre location, and vehicle positions in relation to the object of the accident became precedent during the rest of work'* (Berlin & Carlstrom, 2008: 180).

#### 9.3.2. TWO MANAGERIAL INTERVENTION STRATEGIES FOR FRONTLINE COMMANDERS

Stigmergy is based on the recognition of locally available information, which may occasionally lead to poor decision outcomes (Leonard & Howitt, 2010). Based on NDM, two specific situations can be described. *First*, experienced decision makers operating under time pressure base their decisions on the rapid recognition of local environmental cues, which might lead to decisions that are optimal at the micro level but suboptimal at a macro level. For instance, different firefighting teams who use locally available information to suppress a fire might approach a fire from opposite sides of a building without knowing about each other, which may increase the flames on the opposite side and harm one of the teams. This occurred during the response to the 2008 fatal fire in De Punt in the Netherlands (Helsloot et al. 2009). *Second*, decisions made on a day-to-day basis may be inappropriate in certain situations and require alternative interventions. For instance, in the wildfire situation described in Weick (2001), it would have been better to violate the standard operating procedure of carrying equipment at all times by dropping the equipment and fleeing from the fire.

For these two specific situations, direct and indirect managerial intervention strategies that draw on NDM may be more applied by frontline commanders in practice. However, these strategies cannot be applied often or in every situation. Furthermore, as these strategies are not broadly applied in current practice, empirical investigation is necessitated to examine the effectiveness and application possibilities. The first strategy provides direct control through a simple decision rule taught to emergency responders prior to an event requiring immediate evacuation, with a simple outcome for the decision rule. For instance, a specific whistle signal can be associated with immediate danger and a complete drawback of all field units. Although everyone in the response network would be able to use this signal, it should rarely be used due to its extended range and because its effectiveness would be diminished if it were applied too often or incorrectly.

The second managerial intervention strategy is based on indirect control by influencing the behavior of organizational units by making subtle changes in their environment based on an accurate prediction about how emergency responders will behave in a given situation. This strategy is more difficult to apply because it requires an extensive understanding of how emergency responders typically operate in similar conditions. The strategy was successfully applied by the incident commander at the 1998 Eschede train collision, which led to 101 deaths and 103 injuries (Hüls & Oestern, 1999). On June 3, 1998, a high-speed train traveling at 200 kilometers per hour collided with a bridge and caused it to collapse. As a result, the train broke into two pieces. A frontline commander, who arrived at the scene and observed the initial response from a hill at a distance, noticed that the train wreckage was separated into two large areas, one near the bridge and one far from the bridge. However, following the usual operating procedures, all the arriving units proceeded to the first visible accident site because they were unaware of the other disaster site. Due to nonfunctional communication systems, the incident commander was unable to inform the arriving units about the two accident sites (Köbl 1999; Lange 1999). However, based on the expectation that the frontline workers would drive directly to the first wreckage site they came across, the incident commander directed a police vehicle to block the main road to detour arriving units. Because these units had to take a different road, they were effectively directed to the second accident site (Köbl, 1999).

**Table 9.9: Implications related to current body of knowledge**

<b>Implications related to current body of knowledge</b>	
<b>New addition to the current body of knowledge</b>	Two new managerial intervention strategies are described which can be used in extraordinary situations to guide decision making by autonomous units.
<b>Supports current body of knowledge</b>	-
<b>Contrasts current body of knowledge</b>	Contrary to the common opinion of most crisis management scholars and practitioners (see for a review Groenendaal et al. 2013), this thesis argues that it is largely impossible to control frontline work in the first few hours of a large-scale crisis.

#### **9.4. IMPLICATIONS FOR FURTHER RESEARCH**

This thesis shows the difficulty of establishing the added value of frontline commanders. However, by using various research methods it seems possible to get a better understanding of the effects of frontline command to frontline operations. In addition, this thesis demonstrates that frontline command is a scientific and societal relevant subject of research. Therefore, further investigation is desired to uncover the effects of frontline command to frontline operations. This research should include the following steps:

1. To examine the performance of frontline operations with and without frontline commanders, first an analytical framework needs to be developed. This framework should measure the following aspects: the performance of the frontline operations (e.g. number of solved crimes or number of saved victims), characteristics of task environment (e.g. number of tasks and complexity), characteristics of frontline commanders (e.g. experience with the tasks to be performed) and characteristics of frontline workers (ibid). Based on the findings in this thesis, it is proposed that the interplay between task characteristics, frontline commanders' characteristics and frontline workers characteristics determines the performance of frontline operations.
2. The analytical framework should be used to examine frontline operations in an experimental condition in which frontline workers perform their tasks with and without frontline commanders. In the case of major criminal investigation, this could imply Operational Core Team (OCT) members play a serious game in which they have to solve a major crime. In the normal condition, a Command Core Team (CCT) is involved in the game and responsible for directing OCT members. In the experimental condition, OCT members have to solve the case without directions from a CCT. In the case of an emergency response, a number of major exercises could be organized in which frontline workers have to operate with (normal condition) and without a battalion chief (experimental condition). In both cases, the analytical framework should be used to measure the frontline operations. The results can be used to improve the analytical framework and may also yield new insights for further investigation.
3. To validate the findings in daily practice, it is recommended to conduct pilot studies within frontline organizations in which different variations of frontline command are tested. In the case of major criminal investigation, for instance, this could be conducting a pilot in which only one CCT member supervises the Operational Core Team. The analytical framework can be used to compare the difference between the pilot and other major criminal investigations. In the case of

emergency response, the operations of three districts could be measured. In the first district, the battalion chief responds to all incidents. In the second district, the battalion chief only responds to large-scale or complex incidents (current situation). In the third district, no battalion chief is responding at all. Admittedly, conducting this kind of pilots will not be easy since frontline organizations need to cooperate and the response of battalion chiefs to incidents is rooted in law.

4. When assessing the findings obtained with the analytical framework, the long-term effects of frontline command should be taken into account. For example, it could be possible that frontline workers will only perform better without frontline commanders when they are used to it. Ideally, longitudinal research is conducted in which the effects of frontline command are measured over long periods of time. Furthermore, long-term research is necessitated to gather a vast amount of data about the effects of frontline command. This makes it better possible to uncover the influence of contextual variables on the performance of frontline workers and frontline commanders.

The following questions could be helpful in the analysis of the data:

*FADCM aspects in relation to personal characteristics of frontline commanders.* Some interesting questions: to what extent does the experience of frontline commanders with a certain type of incident affect how they interpret the D-C-M aspects of FADCM? To what extent can FADCM aspects be taught?

*FADCM aspects in relation to characteristics of frontline workers.* Some interesting questions: Do experienced and less experienced frontline workers require different styles of communication? Or more generally, does the degree of experience relate to the way frontline workers need to be commanded during incidents? To what extent does employment in the fire service (professional or voluntary) influence the way in which frontline workers need to be controlled?

*FADCM aspects in relation to characteristics of frontline organizations.* Some interesting questions: Do culture and technology affect the way frontline commanders deal with FADCM aspects? To what extent are decision support systems helpful for B and C aspects during the incident response?

*FADCM aspects in relation to the effectiveness of frontline command and the incident response.* Some interesting questions: To what extent do frontline commanders per-

form better when they use models such as FADCM? To what extent does improved application of FADCM aspects result in improvement of the overall incident response?

When insight is obtained in the functioning and effects of frontline command within major criminal investigation and the response organization of the fire service, comparative research is desired. The following questions deserve further attention: Why does the concept of frontline command works differently in organizations? To what extent is the concept of a frontline commander applicable to other (frontline) organizations? What can police and fire organizations learn from frontline organizations which operate without frontline command?





## References

- Acquino, K. Lewis, M.U. & Bradfield, M. (1999). Justice constructs, negative affectivity, and employee deviance: A proposed model and empirical test. *Journal of Organizational Behavior*, 20, 1073-1091.
- Van den Akker, L. Heres, L. Lasthuizen, K. & Six, F. (2009). Ethical leadership and trust: it's all about meeting expectations. *International Journal of Leadership Studies*, 5(2), 103-122.
- Alexander, D. (2008). Emergency command systems and major earthquake disasters. *Journal of Seismology and Earthquake Engineering*, 10, 138-146.
- Alison, L. Barrett, E. & Crego, J. (2007). Criminal investigative decision making: context and process. In: RR Hoffman ed(s). *Expertise out of Context: Proceedings of the Sixth International Conference on Naturalistic Decision Making*. New York, Laurence Erlbaum.
- Ambrose, M.L. Seabright, M.A. & Schminke, M. (2002). Sabotage in the workplace: The role of organizational injustice. *Organizational Behavior and Human Decision Processes*, 89, 947-965.
- Andrews, R. Boyne, G.A. Meier, K.J. O'Toole, L.J. & Walker, R.M. (2005). Representative bureaucracy, organizational strategy, and public service performance: An empirical analysis of English local government. *Journal of Public Administration Research and Theory*, 15(4), 489-504.
- Arbuthnot, K. (2008). A command gap? A practitioner's analysis of the value of comparisons between the UK's military and emergency services' command and control models in the context of UK resilience operations. *Journal of Contingencies and Crisis Management*. 16(4): 186-194.
- Aronson, E. (2001). Integrating leadership styles and ethical perspectives. *Canadian Journal of Administrative Sciences*, 18, 244-256.
- Arvey, R.D. & Jones, A.P. (1985). The use of discipline in organizational settings: A framework for future research. In: L.L. Cummings & Staw, B.M. (Eds.), *Research in organizational behavior* (pp. 367-408). Greenwich, CT: JAI Press.
- Ashby, W.R. (1956). *An introduction to cybernetics*. New York: Wiley & Sons.

Ashkanasy, N.M. Windsor, C.A. & Treviño, L.K. (2006). Bad apples in bad barrels revisited: Personal factors and organizational rewards as determinants of managerial ethical decision-making. *Business Ethics Quarterly*, 16, 449-474.

Ask, K. & Granhag, P.A. (2005). Motivational sources of confirmation bias in criminal investigations: The need for cognitive closure. *Journal of Investigative Psychology and Offender Profiling*, 2(1), 43-63.

Ask, K. Rebelius, A. & Granhag, P.A. (2008). The 'elasticity' of criminal evidence: A moderator of investigator bias. *Applied Cognitive Psychology*, 22(9), 1245-1259.

Auf der Heide, E. (2006). The importance of evidence-based disaster planning. *Annals of Emergency Medicine*. 47(1): 34-49.

Avolio, B. Luthans, F. & Walumbwa, F.O. (2004). *Authentic Leadership: Theory Building for Veritable Sustained Performance. Working paper*. Lincoln: Gallup Leadership Institute, University of Nebraska.

Avolio, B.J. Bass, B.M. & Jung, D.I. (1999). Re-examining the components of transformational and transactional leadership using the multifactor leadership questionnaire. *Journal of Occupational and Organizational Psychology*, 72, 441-462.

Baddeley, A. (2003). Working memory: looking back and looking forward. *Nature reviews neuroscience*, 4(10), 829-839.

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1986). *Social foundations of thought and action*. Englewood Cliffs, NJ: Prentice Hall.

Barley, S.R. & Kunda, G. (2001). Bringing work back in. *Organization science*, 12(1), 76-95.

Baron, R. M. & Kenny, D.A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173-1182.

Baron, R.A. & Richardson, D.R. (1994). *Human aggression* (2nd ed.). New York: Plenum.

Bass, B.M. & Avolio, B.J. (1993). *Improving organizational effectiveness through transformational leadership*. Thousand Oaks, CA: Sage.

Bass, B.M. (1985). *Leadership and performance beyond expectations*. New York: Free Press.

Beach, L.R. Mitchell, T.R. (1998). *Image theory: Theoretical and empirical foundations*. Mahwah, New Jersey: Lawrence Erlbaum Associates.

Beach, L.R. (1990). *Image theory: Decision making in personal and organizational contexts*. Chichester, UK: Wiley.

Beach, L.R. (1993). Broadening the definition of decision making: The role of pro-choice screening of options. *Psychological Science*, 4(4): 215-20.

Beach, L.R. & Mitchell, T.R. (1987). Image theory: Principles, goals, and plans in decision making. *Acta psychologica*, 66(3), 201-220.

Beach, L.R. & Mitchell, T.R. (1998). The basics of image theory. *Image theory: Theoretical and empirical foundations*. Mahwah, NJ: Lawrence Erlbaum.

Becker, H.S. & Geer, B. (1957). Participant observation and interviewing: A comparison. *Human Organization*, 16(3), 28-32.

Beijer, A. (2010). False Confessions during Police Interrogations and Measures to Prevent Them. *European Journal of Crime Criminal Law & Criminal Justice*, 18, 311.

Beilock, S.L. & Carr, T.H. (2005). When high-powered people fail working memory and 'choking under pressure' in math. *Psychological Science*, 16(2), 101-105.

Berlin, J.M. Carlstrom, E.D. (2008). The 90-second collaboration: A critical study of collaboration exercises at extensive accident sites. *Journal of Contingencies and Crisis Management*. 16(4), 177-185.

Berlin, J.M. & Carlström, E.D. (2011). Why is collaboration minimised at the accident scene?: A critical study of a hidden phenomenon. *Disaster Prevention and Management*, 20(2), 159-171.

Berry, C.M. Ones, D.S. & Sackett, P.R. (2007). Interpersonal deviance, organizational deviance, and their common correlates: A review and meta-analysis. *Journal of Applied Psychology*, 92, 410-424.

Biedermann, A. Bozza, S. Taroni, F. (2008). Decision theoretic properties of forensic identification: Underlying logic and argumentative implications. *Forensic Science International*, 177, 120-32.

Bigley, G.A. & Roberts, K.H. (2001). The incident command system: High-reliability organizing for complex and volatile task environments. *Academy of Management Journal*, 44(6), 1281-1299.

Boersma, K. Comfort, L. Groenendaal, J. & Wolbers, J. (2014). Editorial: Incident Command Systems: A Dynamic Tension among Goals, Rules and Practice. *Journal of Contingencies and Crisis Management*, 22(1), 1-4.

Boin, A. 't Hart, P. (2010). Organising for effective emergency management: Lessons from research. *Australian Journal of Public Administration*, 69(4), 357-371.

Boin, A. 't Hart, P. Stern, E. Sundelius, B. (2005). *The politics of crisis management: Public leadership under pressure*. Cambridge: Cambridge University Press.

Bonabeau, E. Meyer, C. (2001). Swarm intelligence: A whole new way to think about business. *Harvard Business Review*. 79(5): 107-114.

Boye, M. W. & Wasserman, A.R. (1996). Predicting counterproductivity among drug store applicants. *Journal of Business and Psychology*, 10, 337-349.

Brehm, J. & Gates, S. (1997). Working, shirking, and sabotage. *Ann Arbor: University of Michigan Press*.

Brehmer, B. (1992). Dynamic decision making: Human control of complex systems. *Acta Psychologica*, 81(3), 211-241.

Brehmer, B. (2000). Dynamic decision making in command and control. In: McCann, C. Pigeau, R. (eds). *The human in command: exploring the modern military experience*. Kluwer Academic/Plenum Publishers.

Brehmer, B. (2005). Micro-worlds and the circular relation between people and their environment. *Theoretical Issues in Ergonomics Science*, 6(1), 73-93.

Brehmer, B. (2007). Understanding the functions of C2 is the key to progress. *The international C2 journal*, 1(1), 211-232.

Brewer, G.A. (2005). In the eye of the storm: Frontline supervisors and federal agency performance. *Journal of Public Administration Research and Theory*, 15(4), 505-527.

Brodin, E.Z. (2003). Street-level research: Policy at the front lines. *Policy into action: Implementation research and welfare reform*, 145-164.

Brodin, E.Z. (2011). Policy work: Street-level organizations under new managerialism. *Journal of Public Administration Research and Theory*, 21(suppl 2), i253-i277.

Brown, K.M. Dilley, R. & Marshall, K. (2008). Using a head-mounted video camera to understand social worlds and experiences. *Sociological research online*, 13(6), 1.

Brown, M.E. (2007). Misconceptions of ethical leadership: How to avoid potential pitfalls. *Organizational Dynamics*, 36(2): 140-155.

Brown, M.E. & Treviño, L.K. (2006). Ethical leadership: A review and future directions. *The Leadership quarterly*, 17, 595-616.

Brown, M.E. Trevino, L.K. & Harrison, D.A. (2005). Ethical leadership: A social learning perspective for construct development and testing. *Organizational Behavior and Human Decision Processes*, 97, 117-134.

Brugghemans, B. Marynissen, H. (2013). The process of decision-making in a fast-burning crisis situation: a multiple-sequence approach of decisiveness. *International Fire Service Journal of Leadership and Management*, 7, 41-50.

Bryman, A. (2012). *Social research methods* (4<sup>th</sup> edition). New York: Oxford University Press.

Buck, D.A. Trainor, J.E. & Aguirre, B.E. (2006). A critical evaluation of the incident command system and NIMS. *Journal of Homeland Security and Emergency Management*, 3(3), 1-27.

Burke, E. (1997). Competence in command: recent R&D in the London Fire Brigade. *Journal of Managerial Psychology*, 12(4), 261-279.

Burke, E. & Hendry, C. (1997). Decision making on the London incident ground: an exploratory study. *Journal of Managerial Psychology*, 12(1), 40-47.

Burke, L.A. & Miller, M.K. (1999). Taking the mystery out of intuitive decision making. *The Academy of Management Executive*, 13(4), 91-99.

Burns, J.M. (1978). *Leadership*. New York: Harper Row.

Campbell, D.J. (2012). Leadership in Dangerous Contexts. *The Oxford Handbook of Military Psychology*. New York: Oxford University Press.

Cannon-Bowers, J.A. & Bell, H.H. (1997). Training decision makers for complex environments: Implications of the naturalistic decision making perspective. In: Zsombok, C.E. Klein, G. (ed.) *Naturalistic Decision Making*. Mahwah, New Jersey: Lawrence Erlbaum Associates.

Carroll, J.S, Hatakenaka, S. Rudolph, J.W. (2006). Naturalistic decision making and organizational learning in nuclear power plants: Negotiating meaning between managers and problem investigation teams. *Organization Studies*. 27(5): 1037-1057.

Catherwood, D. Edgar, G. K. Sallis, G. Medley, A. & Brookes, D. (2012). Fire alarm or false alarm?!: Situation awareness and decision-making 'bias' of firefighters in training exercises. *International Journal of Emergency Services*, 1(2), 135-158.

Cialdini, R.B. & Goldstein, N.J. (2004). Social influence: Compliance and conformity. *Annual Review of Psychology*, 55, 591-621.

Cohen, M. S. Freeman, J. T. & Wolf, S. (1996). Meta-cognition in time stressed decision making: recognizing, critiquing and correcting. *Human Factors*, 38, 206-219.

Comfort, L.K. Dunn, M. Johnson, D., & Skertich, R. (2004). Coordination in complex systems: increasing efficiency in disaster mitigation and response. *International Journal of Emergency Management*, 2(1), 62-80.

Comfort, L.K. (2007). Crisis management in hindsight: Cognition, communication, coordination and control. *Public Administration Review*, 67(S1), 189-197.

Comfort, L.K. and Kapucu, N. (2006). Inter-organizational coordination in extreme events: The world trade center attacks, September 11, 2001. *Natural Hazards*. 39(2), 309-327.

Comfort, L.K. Dunn, M. Johnson, D. Skertich, R. & Zagorecki, A. (2004). Coordination in complex systems: Increasing efficiency in disaster mitigation and response. *International Journal of Emergency Management*, 2(1), 62-80.

Commissie Onderzoek Vuurwerkramp [Oosting Committee]. (2001). *De Vuurwerkramp, eindrapport* [Fireworks disaster, final report]. Rotterdam: Phoenix & den Oudsten.

Conger, J.A. (1999). Charismatic and transformational leadership in organizations: An insider's perspective on these developing streams of research. *Leadership Quarterly*, 10, 145-169.

Connolly, T. (1999). Action as a fast and frugal heuristic. *Minds and Machines*, 9(4), 479-496.

Considine, M. & Lewis, J.M. (1999). Governance at ground level: The frontline bureaucrat in the age of markets and networks. *Public Administration Review*, 59, 467-480.

Conrad, C. & Poole, M.S. (2011). *Strategic organizational communication: in a global economy*. Chichester, UK: John Wiley & Sons.

Crichton, M.T. Lauche, K. & Flin, R. (2005). Incident command skills in the management of an oil industry drilling incident: A case study. *Journal of Contingencies and Crisis Management*, 13(3), 116-128.

Crookall, D. (2010). Serious games, debriefing, and simulation/gaming as a discipline. *Simulation & Gaming*, 41(6), 898-920.

Dalal, R.S. (2005). A meta-analysis of the relationship between organizational citizenship behavior and counterproductive behavior. *Journal of Applied Psychology*, 90, 1241-1255.

De Cremer, D. & Tyler, T.R. (2005). Managing group behavior: The interplay between procedural fairness, sense of self, and cooperative behavior. In: M. Zanna (Ed.) *Advances in experimental social psychology*. New York: Academic Press.

Defensiestaf (2013). *Nederlandse Defensie Doctrine*. Den Haag: Ministerie van Defensie.

Detert, J.R. Treviño, L.K. Burris, E.R. & Andiappen, M. (2007). Managerial models of influence and counterproductivity in organizations: A longitudinal businessunit level investigation. *Journal of Applied Psychology*, 92, 993-1005.

Dineen, B.R., Lewicki, R.J. & Tomlinson, E.C. (2006). Supervisory guidance and behavioral integrity: Relationships with employee citizenship and deviant behavior. *Journal of Applied Psychology*, 91, 622-635.

Drabek, T.E. (2003). *Strategies for coordination disaster responses*. Boulder, Colorado: Institute of Behavioral Science, University of Colorado.

Drabek, T.E. & McEntire, D.A. (2003). Emergent phenomena and the sociology of disaster: Lessons and opportunities from the research literature. *Disaster Prevention and Management*, 12(2), 97-112.



Dror, I.E. Charlton, D. Peron, A.E. (2006). Contextual information renders experts vulnerable to making erroneous identifications. *Forensic Science International*, 156, 74-8.

Dror, I.E, Charlton, D. (2006). Why experts make errors. *Journal of Forensic Identification*, 56(4), 600-12.

Dror, I.E. Péron, A.E. Hind, S.L. Charlton, D. (2005). When emotions get the better of us: The effect of contextual top-down processing on matching fingerprints. *Applied Cognitive Psychology*, 19(6), 799-809.

Dror, I.E. Rosenthal, R. (2008). Meta-analytically quantifying the reliability and biasability of forensic experts. *Journal of Forensic Sciences*, 53(4), 900-3.

Dror, I.E. Charlton, D. & Péron, A.E. (2006). Contextual information renders experts vulnerable to making erroneous identifications. *Forensic Science International*, 156(1), 74-78.

Dror, I.E. (2009). On proper research and understanding of the interplay between bias and decision outcomes. *Forensic Science International*. 191(1), 17-18.

Van Duin, M. (2011). *Veerkrachtige crisisbeheersing: Nuchter over het bijzondere*. [Resilient crisis management: down-to-earth about the special]. Arnhem / Apeldoorn: Nederlands Instituut Fysieke Veiligheid / Politieacademie.

Durose, C. (2009). Frontline workers and 'local knowledge: Neighbourhood stories in contemporary UK local governance. *Public Administration*, 87(1), 35-49.

Durose, C. (2011). Revisiting Lipsky: Front-Line Work in UK Local Governance. *Political studies*, 59(4), 978-995.

Dvir, T. Eden, D. Avolio, B.J. & Shamir, B. (2002). Impact of transformational leadership on follower development and performance: a field experiment. *Academy of Management Journal*, 45(4), 735-744.

Dynes, R.R. (1990). *Community emergency planning: False assumptions and inappropriate analogies*. Delaware: Disaster Research Center.

Dynes, R.R. (1994). Community emergency planning: False assumptions and inappropriate analogies. *International Journal of Mass Emergencies and Disasters*, 12(2), 141-158.

Dynes, R.R. & Quarantelli, E.L. (1969). *Interorganizational relations in communities under stress*. Columbia, Ohio: Disaster Research Center, The Ohio State University.

Dynes, R.R. & Quarantelli, E.L. (1976). *Organization communications and decision making in crises*. Columbia, Ohio: Disaster Research Center, The Ohio State University.

Eerland, A. & Rassin, E. (2012). Biased evaluation of incriminating and exonerating (non) evidence. *Psychology, Crime & Law*, 18(4), 351-358.

Eerland, A. Post, L.S. Rassin, E. Bouwmeester, S. & Zwaan, R.A. (2012). Out of sight, out of mind: The presence of forensic evidence counts more than its absence. *Acta psychologica*, 140(1), 96-100.

Elliott, T. (2005). *Expert decision-making in naturalistic environments: A summary of research*. Edingburgh, Australia: DSTO Systems Sciences Laboratory.

Endsley, M.R. (1995). Toward a theory of situation awareness in dynamic systems. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, 37(1), 32-64.

FEMA (2008). *National Incident Management System*. US Department of Homeland Security. Washington, DC.

Fiore, S.M. Salas, E. & Cannon-Bowers, J.A. (2001). Group dynamics and shared mental model development. In: London, M. (ed). *How people evaluate others in organizations*. Mahwah, NJ: Lawrence Erlbaum associates.

Flin, R. (1996). *Sitting in the hot seat: Leaders and teams for critical incident management*. Chichester, West Sussex: John Wiley & Sons.

Flin, R.H. & Arbutnot, K. (Eds.). (2005). *Incident command: Tales from the hot seat*. Aldershot: Ashgate.

Flin, R. Slaven, G. & Stewart, K. (1996). Emergency decision making in the offshore oil and gas industry. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, 38(2), 262-277.

Forster, S. & Lavie, N. (2007). High Perceptual Load Makes Everybody Equal Eliminating Individual Differences in Distractibility With Load. *Psychological science*, 18(5), 377-381.

Forster, S. & Lavie, N. (2008). Failures to ignore entirely irrelevant distractors: the role of load. *Journal of Experimental Psychology Applied*, 14(1), 73-89.

Fox, S. Spector, P.E. & Miles, D. (2001). Counterproductive work behavior (CWB) in response to job stressors and organizational justice: some mediator and moderator tests for autonomy and emotions. *Journal of Vocational Behavior*, 59, 291-309.

Fox, S. Spector, P.E. & Miles, D. (1999). *Counterproductive work behaviour (CWB) in response to job stressors and organizational justice: the moderator effect of autonomy and emotion traits*. Paper presented at the annual meeting of the Society for Industrial and Organizational Psychology, Atlanta.

Frank, R.F. (1989). How passion pays: Finding opportunities in honesty. *Business and Society Review*, Summer, 20–28.

Fry, L.W. (2003). Toward a theory of spiritual leadership. *The Leadership Quarterly*, 14, 693-727.

Frye, L.M. & Wearing, A.J. (2014). What were they thinking? A model of metacognition for bushfire fighters. In: C. Owen (ed). *Human factors challenges in emergency management*. Surrey (UK): Ashgate.

Furnham, A., Forde, L., & Ferrari, K. (1999). Personality and workmotivation. *Personality and Individual Differences*, 26, 1035-1040.

Giacalone, R.A., & Knouse, S.B. (1990). Justifying wrongful employee behavior: The role of personality in organizational sabotage. *Journal of Business Ethics*, 9, 55-61.

Gibson, F.P. (2000). Feedback delays: How can decision makers learn not to buy a new car every time the garage is empty? *Organizational Behavior and Human Decision Processes*, 83(1), 141-166.

Giessner, S. R. & Van Knippenberg, D. (2008). *When does a leader show fair behavior? Influences of group prototypicality and the social context*. Paper presented at the 15th General Meeting of the European Association of Experimental Social Psychologists.

Giessner, S. R. Van Knippenberg, D. & Sleebos, E. (2009). License to fail?: how leader group prototypicality moderates the effects of leader performance on perceptions of leadership effectiveness, *Leadership Quarterly*, 20, 434-451.

Gigerenzer, G. (2004). Fast and frugal heuristics: The tools of bounded rationality. In: Koehler, D.J. & Harvey, N. (eds). *Blackwell handbook of judgment and decision making*. Oxford, UK: Blackwell Publishing.

Van Gils, S. Van Quaquebeke, N. & Van Knippenberg, D. (2011). *Tango in the Dark: The Interplay of Leader's and Follower's Level of Self-Construal and its Impact on Ethical Behavior in Organizations*. Rotterdam: Rotterdam School of Management, Erasmus University Rotterdam.

Gofen, A. (2014). Mind the gap: Dimensions and influence of street-level divergence. *Journal of Public Administration Research and Theory*, 24(2), 473-493.

Goltz, S.M. Citera, M. Jensen, M. Favero, J. & Komaki, J.L. (1990). Individual Feedback. *Journal of Organizational Behavior Management*, 10(2), 77-92.

Gonzalez, C. (2012). Training decisions from experience with decision making games, 167-178. In: Durlach, P.J. & Lesgold, A.M. *Adaptive technologies for training and education*. Cambridge: MIT Press.

Gottfredson, M.R. & Hirschi, T. (1990). *A general theory of crime*. Stanford, CA: Stanford University Press.

Grassé, P. (1959). La reconstruction du nid et les coordinations inter-individuelles chez *Bellicositermes natalensis* et *Cubitermes* sp. La théorie de la stigmergie : essai d'interprétation du comportement des termites constructeurs. *Insectes Sociaux*, 6, 41-84.

Greenberg, S. (1990). Sharing views and interactions with single-user applications. In *COIS '90: Proceedings of the Conference on Office Information Systems*, Boston, April.

Groenendaal, J. Weewer, R. Helsloot, I. (2014). Using helmet-mounted cameras to learn about leadership on the fireground. *FireRescue Magazine*. November 2014, 42-47.

Groenendaal, J. Helsloot, I. & Scholtens, A. (2013). A Critical Examination of the Assumptions Regarding Centralized Coordination in Large-Scale Emergency Situations. *Journal of Homeland Security and Emergency Management*, 10(1), 113-135.

Groenendaal, J. & Helsloot, I. (2014). Tunnel vision on tunnel vision? A preliminary examination of the tension between precaution and efficacy in major criminal investigations in the Netherlands. *Police Practice and Research*, 1-15.

Groenendaal, J. Helsloot, I. Bruggemans, B. (2014a). Het benutten van onderzoek naar Naturalistic Decision Making (NDM): Lessen voor brandweer- en andere leidinggevendenden. *Tijdschrift voor Management en Organisatie*, 4, 5-23.

Groenendaal, J. Helsloot, I. Bruggemans, B. (2014b). Betere commandovoering door het FABCM model. *De Brandweerman*. 542, 15-18.

Groenendaal, J. & Helsloot, I. (in press). The application of research into Naturalistic Decision Making (NDM): lessons for fire chiefs and other frontline managers. *Journal of Management and Organization*.

Grossman, R. Spencer, J.M. & Salas, E. (2013). Enhancing Naturalistic Decision Making and Accelerating Expertise in the Workplace: Training Strategies that Work. In: Highhouse, S. Dalal, R.S. Salas, E. (eds). *Judgment and Decision Making at Work*. London: Routledge.

Gruys, M. L. & Sackett, P.R. (2003). Investigating the dimensionality of counterproductive work behavior. *International Journal of Selection and Assessment*, 11, 30-42.

Hains, S.C. Hogg, M.A. & Duck, J.M. (1997). Self-categorization and leadership: Effects of group prototypicality and leader stereotypicality. *Personality and Social Psychology Bulletin*, 23, 1087-1100.

Hall, L.J. Player, E. (2008). Will the introduction of an emotional context affect fingerprint analysis and decision-making? *Forensic Science International*, 181, 36-9.

Hannah, S.T. Uhl-Bien, M. Avolio, B.J. & Cavarretta, F.L. (2009). A framework for examining leadership in extreme contexts. *The Leadership Quarterly*, 20(6), 897-919.

Harper, D. (1990). Spotlight abuse—Save profits. *Industrial Distribution*, 79, 47-51.

Hartman, C. & Tops, P. (2005). *Frontlijnsturing: Uitvoering op de publieke werkvloer van de stad*. Den Haag: Kenniscentrum Grote Steden STIP.

Haslam, S.A. & Platow, M.J. (2001). The link between leadership and followership: How affirming social identity translates vision into action. *Personality and Social Psychology Bulletin*, 27, 1469-1479.

Haslam, S.A. Reicer, S.D. Platow, M.J. (2011). *The new psychology of leadership: Identity, influence and power*. New York: Psychology Press.

Hayes, P.A. & Omodei, M.M. (2011). Managing emergencies: Key competencies for incident management teams. *The Australian and New Zealand Journal of Organisational Psychology*, 4, 1-10.

Helsloot, I. Oomes, E. & Weewer, R. (2010). *Eindrapport evaluatie van de brand in De Punt op 9 mei 2008*. Den Haag: Boom Juridische Uitgevers.

Helsloot, I. & Groenendaal, J. (2011). Naturalistic decision making in forensic science: Toward a better understanding of decision making by forensic team leaders. *Journal of Forensic Sciences*, 56(4), 890-897.

Helsloot, I. Groenendaal, J. Van 't Padje, B. (2012). *Tunnelvisie op tunnelvisie?* Apeldoorn: Politie en Wetenschap.

Henderson, A.C. & Pandey, S.K. (2013). Leadership in Street-Level Bureaucracy: An Exploratory Study of Supervisor-Worker Interactions in Emergency Medical Services. *International Review of Public Administration*, 18(1), 7-23.

Hill, C.J. (2006). Casework job design and client outcomes in welfare-to-work offices. *Journal of Public Administration Research and Theory*, 16, 263-88.

HM Government. (2008). *Incident command – 3<sup>rd</sup> edition. Fire and rescue manual*. UK: The Stationery Office.

Hogarth, R.M. (2010). Intuition: A challenge for psychological research on decision making. *Psychological Inquiry*, 21(4), 338-353.

Hogarth, R.M. (2008). On the learning of intuition. In Plessner, H. Betsch, C. & Betsch, T. (Eds.), *Intuition in judgment and decision making*. Mahwah, NJ: Lawrence Erlbaum Associates.

Hogarth, R.M. (2003). Deciding analytically or trusting your intuition? The advantages and disadvantages of analytic and intuitive thought. *The Advantages and Disadvantages of Analytic and Intuitive Thought (October 2002)*. UPF Economics and Business Working Paper, (654).

Hogarth, R.M. (2001). *Educating intuition*. Chicago: University of Chicago Press.

Hogg, M.A. (2001). A social identity theory of leadership. *Personality and Social Psychology Review*, 5, 184-200.

Hogg, M.A. Hains, S.C. & Mason, I. (1998). Identification and leadership in small groups: Salience, frame of reference, and leader stereotypicality effects on leader evaluations. *Journal of Personality and Social Psychology*, 75, 1248-1263.

Hogg, M.A. & Van Knippenberg, D. (2003). Social identity and leadership processes in groups. *Advances in Experimental Social Psychology*, 35, 1-52.

Hogg, M.A. Abrams, D. Otten, S. & Hinkle, S. (2004). The social identity perspective: intergroup relations, self-conception, and small groups. *Small Group Research*, 35, 246-276.

Hollinger, R. & Clark, J. (1983). *Theft by employees*. Lexington, MA: Lexington Books.

De Hoogh, A.H.B. Den Hartog, D.N. & Koopman, P.L. (2004). De ontwikkeling van de CLIO: Een vragenlijst voor charismatisch leiderschap in organisaties. *Gedrag & Organisatie*, 17, 354-382.

De Hoogh, A.H.B. & Den Hartog, D.N. (2008). Ethical and despotic leadership, relationships with leader's social responsibility, top management team effectiveness and subordinates' optimism: A multi-method study. *The Leadership Quarterly*, 19, 297-311.

De Hoogh, A.H.B. & Den Hartog, D.N. (2009). Empowering behaviour and leader fairness and integrity: studying perceptions of ethical leader behaviour from a levels-of-analysis perspective. *The European Journal of Work and Organizational Psychology*, 18(2), 199-230.

Houghton, R.J. Baber, C. McMaster, R. Stanton, N. A. Salmon, P. Stewart, R. & Walker, G. (2006). Command and control in emergency services operations: a social network analysis. *Ergonomics*, 49(12-13), 1204-1225.

Howell, J.M. & Avolio, B.J. (1993). Transformational leadership, transactional leadership, locus of control and support for innovation: Key predictors of consolidated-business-unit performance. *Journal of Applied Psychology*, 78, 891-902.

Hüls, E. Oestern, H.J. (1999). *Die Katastrophe von Eschede: Erfahrungen und lernen, eine interdisziplinäre analyse* [The Eschede Disaster: Experiences and learning: an interdisciplinary analysis]. Berlin: Springer.

Hunt, J.G. (1999). Transformational/charismatic leadership's transformation of the field: an historical essay. *Leadership Quarterly*, 10(2), 129-144.

Ilies, R. de Pater, I.E. & Judge, T.A. (2007). Differential affective reactions to negative and positive feedback, and the role of self-esteem. *Journal of Managerial Psychology*, 22, 590-609.

Innes, M. (2002). The 'process structures' of police homicide investigations. *British Journal of Criminology*, 42(4), 669-688.

Innes, M. (2003). *Investigating murder: Detective work and the police response to criminal homicide*. Oxford: Oxford University Press.

Inspectie Openbare Orde en Veiligheid (2011). [Public order and safety Inspectorate] Brand Chemie-Pack Moerdijk. Een onderzoek naar de bestrijding van (de effecten van) het grootschalig incident. [Fire at Chemie-Pack Moerdijk. An investigation towards the response to the large-scale incident] Den Haag: Inspectie Openbare Orde en Veiligheid.

Jensen, E. (2009). Sensemaking in military planning: a methodological study of command teams. *Cognition, Technology & Work*, 11(2), 103-118.

Jick, T.D. (1979). Mixing qualitative and quantitative methods: Triangulation in action. *Administrative science quarterly*, 24, 602-611.

Johansen, M.S. (2012). The direct and interactive effects of middle and upper managerial quality on organizational performance. *Administration & Society*, 44(4), 383-411.

Johnson, R.B. Onwuegbuzie, A.J. & Turner, L.A. (2007). Toward a definition of mixed methods research. *Journal of mixed methods research*, 1(2), 112-133.

Jones, D.A. (2009). Getting even with one's supervisor and one's organization: Relationships among types of injustice, desires for revenge, and counterproductive work behaviors. *Journal of Organizational Behavior*, 30, 525-540.

Jones, J.W. & Terris, W. (1985). Screening employee applicants for attitudes towards theft: Three quasi-experimental studies. *International Journal of Management*, 2, 62-72.

Judge, T.A., & Piccolo, R.F. (2004). Transformational and transactional leadership: A meta-analytic test of their relative validity. *Journal of Applied Psychology*, 89, 755-768.



Kahneman, D. (2003). A perspective on judgment and choice: mapping bounded rationality. *American psychologist*, 58(9), 697-720.

Kahneman, D. (2011). *Thinking fast and slow*. London (UK): Penguin.

Kahneman, D. & Klein, G. (2009). Conditions for intuitive expertise: a failure to disagree. *American Psychologist*, 64(6), 515-526.

Kalshoven, K. & Den Hartog, D.N. (2009). Ethical Leader Behavior and Leader Effectiveness: The Role of Prototypicality and Trust. *International Journal of Leadership Studies*, 5(2), 102-120.

Kalshoven, K. Den Hartog, D.N. & De Hoogh, A.H.B. (2011). Ethical leadership at work questionnaire (ELW): Development and validation of a multidimensional measure. *The Leadership Quarterly*, 22, 51-69.

Kamp, J. & Brooks, P. (1991). Perceived organizational climate and employee counter-productivity. *Journal of Business and Psychology*, 5(4), 447-458.

Kanfar, R. (1990). Motivation theory and industrial and organization psychology. In M. D. Dunnette and L. Hough (Eds.), *Handbook of industrial and organizational psychology (Volume 1)*. Palo Alto, CA: Consulting Psychologists Press.

Kanungo, R.N. (2001). Ethical values of transactional and transformational leaders. *Canadian Journal of Administrative Sciences*, 18, 257-265.

Kanungo, R.N. & Mendonca, M. (2001). Ethical leadership and governance in organizations: A Preamble. *Canadian Journal of Administrative Sciences*, 18, 241-243.

Kaptein, M. Huberts, L.W.J.C. Avelino, S. & Lasthuizen, K. (2005). Demonstrating ethical leadership by measuring ethics: A survey of U.S. public servants. *Public Integrity*, 7 (4): 299-311.

Kassin, S.M., Dror, I.E. & Kukucka, J. (2013). The forensic confirmation bias: Problems, perspectives, and proposed solutions. *Journal of Applied Research in Memory and Cognition*, 2(1), 42-52.

Kaufman, H. (2006). *The Forest Ranger: a study in administrative behavior*. Washington: RFF Press (reprinted 1960 edition).

Kelloway, E.K. Loughlin, C. Barling, J., & Nault, A. (2002). Selfreported counterproductive behaviors and organizational citizenship behaviors: Separate but related constructs. *International Journal of Selection and Assessment*, 10, 143-151.

Kerstholt, J.H. & Eikelboom, A.R. (2007). Effects of prior interpretation on situation assessment in crime analysis. *Journal of Behavioral Decision Making*, 20(5), 455-465.

Keys, B. & Wolfe, J. (1990). The role of management games and simulations in education and research. *Journal of Management*, 16(2), 307-336.

Kilduff, G.J. & Galinsky, A.D. (2013). From the ephemeral to the enduring: How approach-oriented mindsets lead to greater status. *Journal of personality and social psychology*, 105(5), 816-831.

Klayman, J. (1995). Varieties of confirmation bias. *Psychology of learning and motivation*, 32, 385-418.

Klein, G.A. & Calderwood, R. (1991). Decision models: Some lessons from the field. *IEEE Transactions on Systems, Man, and Cybernetics*, 21(5), 1018-25.

Klein, G.A. (2008). Naturalistic Decision Making. *Human Factors: The Journal of Human Factors and Ergonomics society*, 50(3), 456-60.

Klein, G.A. (1989). Recognition – Primed Decisions. *Advances in Man-Machine Systems Research*, 5, 47-92.

Klein, G.A. (1993). A recognition-primed decision (RPD) model of rapid decision making. In Klein, G.A. Orasanu, J. Calderwood, R. & Zsombok, C.E. (Eds.), *Decision making in action: Models and methods* (pp. 138-147). Norwood, NJ: Ablex.

Klein, G. (1998). *Sources of power: How people make decisions*. Cambridge, MA: MIT Press.

Klein, G. (2008). Naturalistic decision making. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, 50(3), 456-460.

Klein, G. (2009). *Streetlights and shadows: Searching for the keys to adaptive decision making*. London, England: MIT Press.

Klein, G.A. Calderwood, R. & Clinton-Cirocco, A. (1986). Rapid decision making on the fire ground. In *Proceedings of the Human Factors and Ergonomics Society annual meeting*, 30(6), 576-580.

- Klein, G.A. Calderwood, R. & Macgregor, D. (1989). Critical decision method for eliciting knowledge. *IEEE Transactions on Systems, Man, and Cybernetics*, 19(3), 462-472.
- Klein, K.J. Ziegert, J.C. Knight, A.P. & Xiao, Y. (2006). Dynamic delegation: Shared, hierarchical and deindividualized leadership in extreme action teams. *Administration Science Quarterly*, 51(4), 590-621.
- Van Knippenberg, D. Lossie, N. & Wilke, H. (1994). In-group prototypicality and persuasion: determinants of heuristic and systematic message processing. *British Journal of Social Psychology*, 33, 289-300.
- Van Knippenberg, D. & Hogg, M.A. (2003). A social identity model of leadership effectiveness in organizations. *Research in Organizational Behavior*, 25, 243-296.
- Van Knippenberg, B. & Van Knippenberg, D. (2005). Leader self-sacrifice and leadership effectiveness: The moderating role of leader prototypicality. *Journal of Applied Psychology*, 90, 25-37.
- Köbl, I. (1999). ICE-Unglück Eschede: Gesamteinsatz [ICE train crash at Eschede: Emergency response operation]. *BrandSchutz*, 6, 521-548.
- Komaki, J. Heinzmann, A.T. & Lawson, L. (1980). Effect of training and feedback: component analysis of a behavioral safety program. *Journal of Applied Psychology*, 65(3), 261-270.
- Komaki, J.L. Collins, R.L. & Penn, P. (1982). The role of performance antecedents and consequences in work motivation. *Journal of Applied Psychology*, 67(3), 334.
- Koppl, G. (2005). How to improve forensic science. *European Journal of Law and Economics*, 20(3), 255-286.
- Koschmann, M.A. (2013). The communicative constitution of collective identity in interorganizational collaboration. *Management Communication Quarterly*, 27(1), 61-89.
- Kunda, Z. (1990). The case for motivated reasoning. *Psychological bulletin*, 108(3), 480-498.
- Lange, C. (1999). ICE-Unglück Eschede: *Technische Rettung* [ICE train crash at Eschede: Technical rescue operation]. *BrandSchutz*, 6, 549-556.

Langenburg, G. Champod, C. & Wertheim, P. (2009). Testing for potential contextual bias effects during the verification stage of the ACE-V methodology when conducting fingerprint comparisons. *Journal of Forensic Sciences*, 54(3), 571-581.

Lasthuizen, K. (2008). *Leading to integrity: Empirical research into the effects of leadership on ethics and integrity*. Amsterdam: VU University Amsterdam.

Lee, K. & Allen, N.J. (2002). Organizational citizenship behavior and workplace deviance: The role of affect and cognitions. *Journal of Applied Psychology*, 87, 131-142.

Lee, V.B. & Spector, P.E. (2006). The social stressors-counterproductive work behaviors link: Are conflicts with supervisors and coworkers the same? *Journal of Occupational Health Psychology*, 11(2), 145-156.

Leonard, H.B. Howitt, A.M. (2010). Organising response to extreme emergencies: The Victorian bushfires of 2009. *Australian Journal of Public Administration*, 69(4), 372-386.

Li, W.C. Li, L.W. Harris, D. & Hsu, Y.L. (2014). The Application of Aeronautical Decision-making Support Systems for Improving Pilots' Performance in Flight Operations. *Journal of Aeronautics, Astronautics and Aviation*, 46(2), 114-123.

Liberman, N. Trope, Y. & Stephan, E. (2007). Psychological distance. In: Kruglanski, A.W. & Higgins, E.T. *Social psychology: Handbook of basic principles*. New York: The Guilford Press.

Lipponen, J. Koivisto, S. & Olkkonen, M.E. (2005) Procedural justice and status judgements: The moderating role of leader ingroup prototypicality. *Leadership Quarterly*, 16, 517-528.

Lipshitz, R. Klein, G.A. Orasanu, J. Salas, E. (2001). Focus Article: Taking Stock of Naturalistic Decision Making. *Journal of Behavioral Decision Making*, 14(5), 331-352.

Lipshitz, R. Klein, G. & Carroll, J.S. (2006). Introduction to the special issue. Naturalistic decision making and organizational decision making: Exploring the intersections. *Organization Studies*, 27(7), 917-923.

Lipshitz, R., Klein, G., Orasanu, J., & Salas, E. (2001). Taking stock of naturalistic decision making. *Journal of Behavioral Decision Making*, 14(5), 331-352.

Lipshitz, R. Omodei, M. McLennan, J. & Wearing, A. (2007). What's burning? The RAWFS heuristic on the fire ground. In: Hofmann, R.R. (Ed). *Expertise out of context*. New York: Lawrence Erlbaum Associates.

Lipsky, M. (1980). *Street level bureaucrats*. Nova York: Russel Sage.

Lord, R.G. Foti, R.J. & DeVader, C.L. (1984). A test of leadership categorization theory: Internal structure, information processing, and leadership perceptions. *Organizational Behavior and Human Performance*, 34, 343-378.

Lord, R.G. & Hall, R. (2003). Identity, leadership categorization and leadership schema. In Van Knippenberg, D. & Hogg, M.A. (Eds.), *Leadership and power: Identity processes in groups and organizations*. London: Sage.

Lord, R.G. & Maher, K.J. (1991). Cognitive theory in industrial and organizational psychology. In M.D. Dunnette and L.M. Hough, eds., *Handbook of industrial and Organizational Psychology*. Palo Alto, CA: Consulting Psychologists Press.

Lowe, K. Kroeck, K.G. & Sivasubrahmanian, N. (1996). Effective correlates of transformational and transactional leadership: A meta-analytic review. *The Leadership Quarterly*, 7, 385-425.

Luthans, F. & Avolio, B. (2003). Authentic leadership: A positive development approach. In K. S. Cameron, J. E. Dutton, & R. E. Quinn (Eds.), *Positive organizational scholarship*. San Francisco: Berrett-Koehler.

Mamede, S. Schmidt, H.G. Rikers, R.M. Custers, E.J. Splinter, T.A. & van Saase, J.L. (2010). Conscious thought beats deliberation without attention in diagnostic decision-making: at least when you are an expert. *Psychological research*, 74(6), 586-592.

Marion, R. & Ulh-Bien, M. (2001). Leadership in complex organizations. *The Leadership Quarterly*, 12(4), 389-418.

Markus, B. & Schuler, H. (2004). Antecedents of counterproductive behavior at work: a general perspective. *Journal of Applied Psychology*, 89(4), 647-660.

Marsh, L. & Onof, C. (2008). Stigmergic epistemology, stigmergic cognition. *Cognitive Systems Research*, 9(1-2), 136-149.

Martinko, M.J. Gundlach, M.J. & Douglas, S.C. (2002). Toward an integrative theory of counterproductive workplace behavior: A causal reasoning perspective. *International Journal of Selection and Assessment*, 10(1-2), 36-50.

Martinko, M.J. & Zellars, K.L. (1998). Toward a theory of workplace violence: A cognitive appraisal perspective. In Griffin, R.W. O'Leary-Kelly, A. & Collins, J.M. (eds.) *Dysfunctional behavior in organizations: Violant and deviant behavior*, 1-42. Stamford, CT: JAI Press.

Marynissen, H. (2013). Waarom communicatie niet werkt? *Ad Rem*, 4, 8-10.

Mathieu, J.E. Heffner, T.S. Goodwin, G.F. Salas, E. & Cannon-Bowers, J.A. (2000). The influence of shared mental models on team process and performance. *Journal of Applied Psychology*, 85(2), 273-283.

May, P.J. & Winter, S.C. (2009). Politicians, managers, and street-level bureaucrats: Influences on policy implementation. *Journal of Public Administration Research and Theory*, 19(3), 453-476.

Mayer, I. (2012). Towards a comprehensive methodology for the research and evaluation of serious games. *Procedia Computer Science*, 15, 233-247.

Mayer, D.M. Kuenzi, M. Greenbaum, R.L. (2010). Examining the link between ethical leadership and employee misconduct: the mediating role of ethical climate. *Journal of Business Ethics*, 95, 7-16.

Mayer, D.M. Kuenzi, M. Greenbaum, R.L. Bardes, R. & Salvador, M.R. (2009). How low does ethical leadership flow? Test of a trickle-down model. *Organizational Behavior and Human Decision Processes*, 108, 1-13.

Mayer, I.S. (2009). The gaming of policy and the politics of gaming: A review. *Simulation & Gaming*, 40(6), 825-862.

Maynard-Moody, S.W. & Musheno, M.C. (2003). *Cops, teachers, counselors: Stories from the front lines of public service*. Michigan: University of Michigan Press.

Maynard-Moody, S.W. & Musheno, M.C. (2000). State agent or citizen agent: Two narratives of discretion. *Journal of Public Administration Research and Theory*, 10(2), 329-358.

McCauley C. (1989). The Nature of Social Influence in Groupthink: Compliance and Internalization. *Journal of Personality and Social Psychology*, 57(2), 250-60.

McEntire, D.A. (2002). Coordinating multi-organisational responses to disaster: lessons from the March 28, 2000, Fort Worth tornado. *Disaster Prevention and Management*, 11(5), 369-379.

McGuire, M. & Silvia, C. (2010). The effect of problem severity, managerial and organizational capacity, and agency structure on intergovernmental collaboration: Evidence from local emergency management. *Public Administration Review*, 70(2), 279-288.

McLennan, J. Holgate, A.M. Omodei, M.M. & Wearing, A.J. (2006). Decision making effectiveness in wildfire incident management teams. *Journal of Contingencies and Crisis Management*, 14(1), 27-37.

McLennan, J. Holgate, A. Omodei, M.M. & Wearing, A.J. (2003). Good, Poor, and Disastrous Small-Unit Command: Lessons from the Fireground. In *39th International Applied Military Psychology Symposium, Brussels* (pp. 1-7).

McMillan, E. (2004). *Complexity, organizations and change*. *Routledge Studies on Complexity in Management*. New York: Routledge.

Meij, G. (2004). *Sticking to plans: capacity limitation or decision-making bias?* Amsterdam: University of Amsterdam, Faculty of Social and Behavioral Sciences. (Dissertation).

Meissner, C.A. & Kassin, S.M. (2002). He's guilty!: investigator bias in judgments of truth and deception. *Law and human behavior*, 26(5), 469.

Mendonca, D.J. & Wallace, W.A. (2007). A cognitive model of improvisation in emergency management. *Systems, Man and Cybernetics, Part A: Systems and Humans, IEEE Transactions on*, 37(4), 547-561.

Meyers, M.K. & Vorsanger, S. (2007). Street-level bureaucrats and the implementation of public policy. In: Peters, G.P. & Pierre, J. (Eds). *The handbook of public administration*. London: Sage.

Miles, D.E. Borman, W.E. Spector, P.E. & Fox, S. (2002). Building an integrative model of extra role work behaviors: A comparison of counterproductive work behavior with organizational citizenship behavior. *International Journal of Selection and Assessment*, 10, 51-57.

Mintzberg, H. (2009). *Managing*. San Francisco: Berrett-Koehler.

Montgomery, H. Lipshitz, R. Brehmer, B. (2005). *How professionals make decisions*. Mahwah, New Jersey: Lawrence Erlbaum Associates.

Morgan, G. (1982). Cybernetics and organization theory: epistemology or technique? *Human Relations*, 35(7), 521-537.

Morrell, K. (2004). Decision making and business ethics: The implications of using image theory in preference to rational choice. *Journal of Business Ethics*, 50(3), 239-52.

Morris, J.C. (2007). Reaching for the Philosopher's Stone: Contingent Coordination and the Military's Response to Hurricane Katrina. *Public Administration Review*, 67, 94-106.

Mosier, K.L. Skitka, L.J. Heers, S. & Burdick, M. (1998). Automation bias: Decision making and performance in high-tech cockpits. *The International Journal of Aviation Psychology*, 8(1), 47-63.

Moynehan, D.P. (2009). The network governance of crisis response: Case studies of incident command systems. *Journal of Public Administration Research and Theory*, 19, 895-915.

Nederlands Instituut Fysieke Veiligheid (2011). [Netherlands Institute for Safety] Onderzoek naar het brandweeroptreden bij de brand in Parkeergarage De Appelaar. [Investigation to the response to the Appelaar garage fire by the fire service] Arnhem: Nederlands Instituut Fysieke Veiligheid. Netherlands Institute for Safety (IFV)

Njå, O. & Rake, E.L. (2008). An essay on research methodology: An alternative approach to incident command research through participatory action research. *Journal of contingencies and Crisis Management*, 16(2), 91-100.

O'Leary, R. (2010). Guerrilla employees: Should managers nurture, tolerate, or terminate them?. *Public Administration Review*, 70(1), 8-19.

O'Brien, B. (2009). Prime suspect: An examination of factors that aggravate and counteract confirmation bias in criminal investigations. *Psychology, Public Policy, and Law*, 15(4), 315-334.

O'Toole, L.J. Jr. & Meier, K.J. (2003). Plus ca change: Public management, personnel stability, and organizational performance. *Journal of Public Administration Research and Theory*, 13(1): 43-64.

Omodei, M.M. Wearing, A. & McLennan, J. (1997). Head-mounted video recording: A methodology for studying naturalistic decision making. In: Flin, R. Salas, E. Strub, M. Martin, L. (eds). *Decision Making under stress: Emerging themes and applications*. Aldershot: Ashgate.



Omodei M.M. McLennan, J. Elliot, G.C. Wearing, A.J. & Clancy, J.M. (2005). More is better? A bias toward overuse of resources in naturalistic decision-making settings. In: Montgomery H, Lipshitz R, Brehmer B. *How professionals make decisions*. Oxford: Routledge.

Omodei, M.M. McLennan, J. & Wearing, A.J. (2005). How expertise is applied in real-world dynamic environments: Head mounted video and cued recall as a methodology for studying routines of decision making. In: Betsch, T. & Haberstroh, S. (Eds.). *The routines of decision making*. Mahwah, NJ: Lawrence Erlbaum Associates.

Omodei, M.M. McLennan, J., & Wearing, A. (2002). Head-Mounted Video Cued Recall: A Methodology for Detecting, Understanding, and Minimising Error in the Control of Complex Systems. In *Proc. 21st European Annual Conference of Human Decision Making and Control, GIST technical report G*.

Omodei, M.M. McLennan, J. Elliott, G.C. Wearing, A.J. Clancy, J.M. (2005). More is better? A bias toward overuse of resources in naturalistic decision-making settings. In: Montgommery, H. (Ed.). *How professionals make decisions*. Mahwah, NJ: Lawrence Erlbaum Associates.

Oomes, E. (2006). De vanzelfsprekendheid van alledag: Een beschouwing in drie delen over de gewoonten in het brandweervak. [The obviousness of everyday: Reflections in three parts on routines in the fire service profession]. Arnhem: Nederlands Instituut Fysieke Veiligheid.

Orasanu, J. (2005). Crew collaboration in space: A naturalistic decision-making perspective. *Aviation, Space and Environmental Medicine*, 76(6), 154-63.

Orasanu, J. & Martin, L. (1998). Errors in aviation decision making: A factor in accidents and incidents. In *2nd Workshop on Human Error, Safety, and System Development, Seattle, Washington, USA* (pp. 100-107).

Oskamp, S. (1965). Overconfidence in case-study judgments. *Journal of Consulting Psychology*, 29(3), 261-65.

Paine, L.S. (1994). Managing for Organizational Integrity. *Harvard Business Review*, March-April, 106-117.

Patel, V.L. Kaufman, D.R. & Arocha, J.F. (2002). Emerging paradigms of cognition in medical decision making. *Journal of Biomedical Informatics*, 35(1), 52-75.

Pennington, N. Hastie, R. (1993a). Explaining the evidence: Tests of the story model for juror decision making. *Journal of Personality and Social Psychology*, 62(2), 189-206.

Pennington, N. Hastie, R. (1993b). Reasoning in explanation-based decision making. *Cognition*, 49, 123-63.

Pennington, N. & Hastie, R. (1988). Explanation-based decision making: Effects of memory structure on judgment. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 14(3), 521-533.

Pennington, N. & Hastie, R. (1992). Explaining the evidence: Tests of the Story Model for juror decision making. *Journal of personality and social psychology*, 62(2), 189-206.

Perry, R.W. Lindell, M.K. (2006). *Emergency planning*. John Wiley & Sons: Hoboken, NJ.

Platow, M.J. & Van Knippenberg, D. (2001). A social identity analysis of leadership endorsement: The effects of leader ingroup prototypicality and distributive intergroup fairness. *Personality and Social Psychology Bulletin*, 27, 1508-1519.

Platow, M.J. Van Knippenberg, D. Haslam, S.A. Van Knippenberg, B. & Spears, R. (2006). A special gift we bestow on you for being representative of us: considering leader charisma from a self categorization perspective. *British Journal of Social Psychology*, 45, 303-320.

Pliske, R.M. McCloskey, M.J. Klein, G. (2001). Decision skills training: Facilitating learning from experience. In: Salas, Ed. Klein, G. (eds). *Linking expertise and Naturalistic Decision Making*. Mahwah, NJ: Lawrence Erlbaum Associates.

Polit, D.F. & Beck, C.T. (2004) *Nursing Research. Principles and Methods*. Philadelphia, PA: Lippincott Williams & Wilkins.

Posthumus, F. (2005). Evaluatieonderzoek in de Schiedammer parkmoord: rapportage in opdracht van het College van Procureurs Generaal [Evaluation of the Schiedammer parkmoord murderer]. The Hague: Openbaar ministerie.

Pressman, J.L. & Wildavsky, A. (1973). *Implementation*. Berkeley, CA: University of California Press.

Programma Versterking Opsporing (PVO) (2010). *Eindrapportage PVO* [Final evaluation PVO]. *Landelijk beeld implementatie PVO bij de politie*. The Hague: Landelijk programmabureau versterking opsporing.

Pyrek, K. (2007). *Forensic science under siege*. San Diego: Elsevier Academic Press.

Quarantelli, E.L. (1986). *Disaster Crisis Management*. Preliminary Paper 113. Disaster Research Center. Delaware: University of Delaware.

Quarantelli, E.L. (1988). Disaster Crisis Management: A summary of research findings. *Journal of Management Studies*, 25(4), 373-385.

Rake, E.L., & Njå, O. (2009). Perceptions and performances of experienced incident commanders. *Journal of Risk Research*, 12(5), 665-685.

Rasmussen, J. (1982). Human errors. A taxonomy for describing human malfunction in industrial installations. *Journal of occupational accidents*, 4(2), 311-333.

Rasmussen, J. (1983). Skills, rules, and knowledge; signals, signs, and symbols, and other distinctions in human performance models. *Systems, Man and Cybernetics, IEEE Transactions*, 3, 257-266.

Rasmussen, J. Brehmer, B. Leplat, J. (eds). (1991). *Distributed decision making: Cognitive models for cooperative work*. Chichester: John Wiley & Sons.

Rassin, E. (2007) *Waarom ik altijd gelijk heb: Over tunnelvisie*. [Why I am always right: about tunnel vision]. Schiedam: Scriptum.

Rassin, E. Eerland, A. & Kuijpers, I. (2010). Let's find the evidence: An analogue study of confirmation bias in criminal investigations. *Journal of Investigative Psychology and Offender Profiling*, 7(3), 231-246.

Rea, L.M. & Parker, R.A. (2012). *Designing and conducting survey research: A comprehensive guide*. New York: John Wiley & Sons.

Rees, G. Frackowiak, R. & Frith, C. (1997). Two modulatory effects of attention that mediate object categorization in human cortex. *Science*, 275(5301), 835-838.

Resick, C.J. Hanges, P.J. Dickson, M.W. & Mitchelson, J.K. (2006). A cross-cultural examination of the endorsement of ethical leadership. *Journal of Business Ethics*, 63, 345-359.

- Riccucci, N.M. (2005). Street-level bureaucrats and intrastate variation in the implementation of temporary assistance for needy families policies. *Journal of Public Administration Research and Theory*, 15(1), 89-111.
- Riccucci, N.M. Meyers, M.K. Lurie, I. & Han, J.S. (2004). The Implementation of Welfare Reform Policy: The Role of Public Managers in Front-Line Practices. *Public Administration Review*, 64(4), 438-448.
- Rimstad, R. Njå, O. Rake, E.L. & Braut, G.S. (2014). Incident Command and Information Flows in a Large-Scale Emergency Operation. *Journal of Contingencies and Crisis Management*, 22(1), 29-38.
- Rittel, H.W. & Webber, M.M. (1973). Dilemmas in a general theory of planning. *Policy sciences*, 4(2), 155-169.
- Roach, K. (2010). Wrongful convictions: adversarial and inquisitorial themes. *North Carolina Journal of International Law and Commercial Regulation*, 35, 387-393.
- Roberts, N.C. (2011). Beyond smokestacks and silos: Open-source, web-enabled coordination in organizations and networks. *Public Administration Review*, 71(5), 677-693.
- Robinson, S. L. & Bennett, R.J. (1995). A typology of deviant workplace behavior: A multidimensional scaling study. *Academy of Management Journal*, 38, 555-572.
- Robinson, S.L. & Bennett, R.J. (1997). Workplace Deviance: Its Definitions, its Manifestations, and its Causes. In Lewicki, , R.J. Bies, R.J. & Sheppard, B.H. (Eds.), *Research on Negotiations in Organizations*. Greenwich, CT: JAI Press Inc.
- Robinson, S. L. & Bennett, R.J. (2000). Development of a measure of Workplace Deviance. *Journal of Applied Psychology*, 85(3), 349-360.
- Smith, W. & Dowell, J. (2000). A case study of co-ordinative decision-making in disaster management. *Ergonomics*, 43(8), 1153-1166.
- Rosenthal, U. Charles, M.T. & 't Hart, P. (Eds.). (1989) *Coping with crisis. The management of disasters, riots and terrorism*. Springfield: Charles C. Thomas.
- Roth, E.M., Multer, J. & Raslear, T. (2006). Shared situation awareness as a contributor to high reliability performance in railroad operations. *Organization Studies*, 27(7), 967-987.

Sackett, P.R. & DeVore, C.J. (2001) Counterproductive behaviors at work. In Anderson, N. Ones, D.S. Sinangil, H.K. & Viswesvaran, V. (eds), *International Handbook of industrial, work and organizational psychology*. London: Sage.

Saks, M. (2009). Concerning L.J. Hall, E. Player 'Will the introduction of an emotional context affect fingerprint analysis and decision-making?' *Forensic Science International*. 191, 36-9.

Saks, M.J Risinger, D.M. Rosenthal, R. Thompson, W.C. (2003). Context effects in forensic science: A review and application of the science of science to crime laboratory practice in the United States. *Science & Justice*, 43(2), 77-90.

Salas, E.E. & Klein, G.E. (2001). *Linking expertise and naturalistic decision making*. Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Salas, E. Prince, C. Baker, D.P. & Shrestha, L. (1995). Situation awareness in team performance: Implications for measurement and training. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, 37(1), 123-136.

Salas, E. Rosen, M.A. & DiazGranados, D. (2010). Expertise-based intuition and decision making in organizations. *Journal of Management*, 36(4), 941-973.

Schneeweiss, C. (2003). Distributed decision making. A unified approach. *European Journal of Operational Research*, 150(1), 237-252.

Schneider, S.K. (1992). Governmental response to disasters. The conflict between bureaucratic procedures and emergent norms. *Public Administration Review*, 52(2): 135-145.

Scholtens, A. (2008). Controlled collaboration in disaster and crisis management in the Netherlands: History and practice of an overestimated and underestimated concept. *Journal of Contingencies and Crisis Management*, 16(4), 195-207.

Scholtens, A. & Drent, P.B.G. (2004). *Brand in de Koningkerk te Haarlem*. [Fire in the Koningkerk Haarlem]. Den Haag: Inspectie Openbare Orde en Veiligheid.

Scholtens, A. Jorritsma, J. & Helsloot, I. (2014). On the Need for a Paradigm Shift in the Dutch Command and Information System for the Acute Phase of Disasters. *Journal of Contingencies and Crisis Management*, 22(1), 39-51.

Semmer, N.K. Jacobshagen, N. Meier, L.L. & Elfering, E. (2010). *Illegitimate tasks as a source of stress*. Manuscript submitted for publication.

Shannon, C. E. & Weaver, W. (1949). *The mathematical theory of communication*. Illinois: University of Illinois Press.

Shattuck, L.C.L.G. & Woods, D.D. (2000). Communication of intent in military command and control systems. In McCann, C. & Pigeau, R. (Eds). *The Human in Command*. New York: Springer.

Shattuck, L.C.L.G. (2000). Communicating intent and imparting presence. *Military Review*. March and April. 66-72.

Simon, H.A. (1955). A Behavioral model of rational choice. *The Quarterly Journal of Economics*, 69(1), 99-118.

Simon, H.A. (1992). What is an 'explanation' of behavior? *Psychological Science*, 3(3), 150-161.

Skarlicki, D. P. & Folger, R. (1997). Retaliation in the workplace: The roles of distributive, procedural, and interactional justice. *Journal of Applied Psychology*, 82, 434-443.

Skinner, B.F. (1953). *Science and human behaviour*. New York: MacMillan.

Snook, B. & Cullen, R. M. (2008). Bounded rationality and criminal investigations: Has tunnel vision been wrongfully convicted? *Criminal investigative failures*, 71-98.

Spector, P.E. & Fox, S. (2002). An emotion centered model of voluntary work behavior: Some parallels between counterproductive work behavior and organizational citizenship behavior. *Human Resource Management Review*, 12, 269-292.

Spector, P.E. (2006). Method Variance in Organizational Research: Truth or Urban Legend? *Organizational Research Methods*, 9, 221-232.

Spector, P.E. & Fox, S. (2005). The stressor-emotion model of counterproductive work behavior. In P.E. Spector & S. Fox (Eds.), *Counterproductive work behavior: Investigations of actors and targets*, 151–174. Washington, DC: American Psychological Association.

Stacey, R.D. (2010). *Complexity and organizational reality: Uncertainty and the need to rethink management after the collapse of investment capitalism*. Abingdon, UK: Routledge.

Stacey, R.D. Griffin, D. Shaw, P. (2000). *Complexity and management: Fad or radical challenge to systems thinking?* New York: Routledge.

Stanovich, K. E. & West, R. F. (2000). Advancing the rationality debate. *Behavioral and brain sciences*, 23(5), 701-717.

Stanton, N. A. Stewart, R. Harris, D. Houghton, R.J. Baber, C. McMaster, R. & Green, D. (2006). Distributed situation awareness in dynamic systems: theoretical development and application of an ergonomics methodology. *Ergonomics*, 49(12-13), 1288-1311.

Stewart, D.W. & Shamdasani, P.N. (1990). *Focus Groups; Theory and Practice*. Newbury Park: Sage.

Stout, R.J. Cannon-Bowers, J.A. Salas, E. & Milanovich, D.M. (1999). Planning, shared mental models, and coordinated performance: An empirical link is established. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, 41(1), 61-71.

Tajfel, H. & Turner, J.C. (1986). *The social identity theory of intergroup behaviour*. In Worchel, S. & Austin, W.G. (Eds.). *Psychology of intergroup relations*, 7-24, Chicago: Nelson-Hall.

Taroni, F. Bozza, S. Bernard, M. Champod, C. (2007). Value of DNA tests: A decision perspective. *Journal of Forensic Science*, 52(1), 31-9.

The City of Oklahoma City. (1996). *Murrah federal building bombing 19 April 1995*. Oklahoma: Fire Protection Publications, Oklahoma State University.

The Public Order and Safety Inspectorate [Inspectie Openbare Orde en Veiligheid] (2011). Brand Chemie-Pack Moerdijk. Een onderzoek naar de bestrijding van (de effecten van) het grootschalig incident. Den Haag: Inspectie Openbare Orde en Veiligheid.

The Stationery Office (2008). *Incident Command Manual version 2008*. London: The Stationery Office.

Theraulaz, G. & Bonabeau, E. (1999). A brief history of stigmergy. *Artificial Life*, 5(2), 97-116.

Thompson, W.C. & Cole, S.A. (2006). Psychological aspects of forensic identification evidence. In: Constanzo, M. Krauss, D. & Pezdek, K. (Eds.). *Expert psychological testimony for the courts*. New-York: Lawrence Erlbaum & Associates.

Tierney, K. & Trainor, J. (2004). *Networks and resilience in the World Trade Center disaster. Research Progress and Accomplishments*. Buffalo, NY: Multidisciplinary Center for Earthquake Engineering Research.

Tissington, P. (2001). *Emergency decision making by fire commanders*. Doctoral thesis. Aberdeen: University of Aberdeen.

Tissington, P. (2004). Command Decisions. *Fire Engineering Journal*, 2004, april, 42-44.

Tong, S. Bryant, R.P. & Horvath, M.A.H. (2009). *Understanding criminal investigation*. Chichester: Wiley-Blackwell.

Tops, P.W. (2007). Kennis van de frontlijn. *Rede uitgesproken ter gelegenheid van de installatie tot lid van het College van Bestuur van de Politieacademie*. Apeldoorn: Politieacademie.

Treviño, L.K. (1986). Ethical decision making in organizations: A person–situation interactionist model. *Academy of Management Review*, 11, 601–617.

Treviño, L.K. Hartman, L.P. & Brown, M. (2000). Moral person and moral manager: How executives develop a reputation for ethical leadership. *California Management Review*, 42, 128–142.

Trevino, L.K. Brown, M. & Hartman, L.P. (2003). A qualitative investigation of perceived executive ethical leadership: Perceptions from inside and outside the executive suite. *Human Relations*, 56, 5–37.

Treviño, L. K. & Brown, M.E. (2005). The role of leaders in influencing unethical behavior in the workplace. In Kidwell, R. & Martin, C. (Eds.) *Managing Organizational Deviance*. Thousand Oaks, CA: Sage.

Treviño, L.K. Weaver, G. Gibson, D. & Toffler, B. (1999). Managing ethics and legal compliance: What works and what hurts. *California Management Review*, 41(2), 131-151.

Treviño, L.K. & Youngblood, S.A. (1990). Bad apples in bad barrels: A causal analysis of ethical decision-making behavior. *Journal of Applied Psychology*, 75, 378-385.

Trope, Y. & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological review*, 117(2), 440-463.

Turner, N. Barling, J. Epitropaki, O. Butcher, V. & Milder, C. (2002). Transformational leadership and moral reasoning. *Journal of Applied Psychology*, 87, 304-311.

Tversky, A. & Kahneman, D. (1974). Judgement under uncertainty: heuristics and biases. *Science*, 185, 1124-1131.



- Tyler, T.R. & Lind, E.A. (1992). A relational model of authority in groups. In: Zanna, M. (Ed.), *Advances in Experimental Social Psychology*. New York: Academic Press.
- Valckenaers, P. Van Brussel, H. Kollingbaum, M. & Bochmann, O. (2006). Multi-agent coordination and control using stigmergy applied to manufacturing control. *Lecture Notes in Computer Science*, 2086, 317-334.
- Van Creveld, M. (1985). *Command in war*. Cambridge, Massachusetts: Harvard University Press.
- Van Maanen, J. (2010). Identity work and control in occupational communities. In: S.B. Sitkin, L.B. Cardinal and K.M. Bijlsma-Frankema (eds). *Organizational control*. New York: Cambridge University Press.
- Van Thiel, S. (2010). *Bestuurskundig onderzoek: een methodologische inleiding*. Bussum: Uitgeverij Coutinho.
- Vardi, Y. & Weitz, E. (2004). *Misbehavior in organizations: theory, research, and management*. Mahwah, New Jersey: Lawrence Erlbaum.
- Vardi, Y. & Wiener, Y. (1996). Misbehavior in organizations: A motivational framework. *Organization science*, 7(2), 151-165.
- Vinzant, J. & Crothers, L. (1994). Street-level leadership: The role of patrol officers in community policing. *Criminal Justice Review*, 19(2), 189-211.
- Vinzant, J. & Crothers, L. (1996). Street-level leadership: Rethinking the role of public servants in contemporary governance. *The American Review of Public Administration*, 26(4), 457-476.
- Waugh, W.L. & Streib, G. (2006). Collaboration and leadership for effective emergency management. *Public Administration Review*, 66(s1), 131-140.
- Weaver, G.R. Treviño, L.K. & Agle, B. (2005). Somebody I look up to: Ethical role models in organizations. *Organizational Dynamics*, 34, 313-330.
- Webb, E. J. Campbell, D.T. Schwartz, R.D. & Sechrest, L. (1966). *Unobtrusive measures*. Chicago: Rand McNally.
- Webster, D.M. & Kruglanski, A.W. (1997). Cognitive and social consequences of the need for cognitive closure. *European review of social psychology*, 8(1), 133-173.
- Weick, K.E. (1995). *Sensemaking*. Thousands Oaks, CA: Sage.

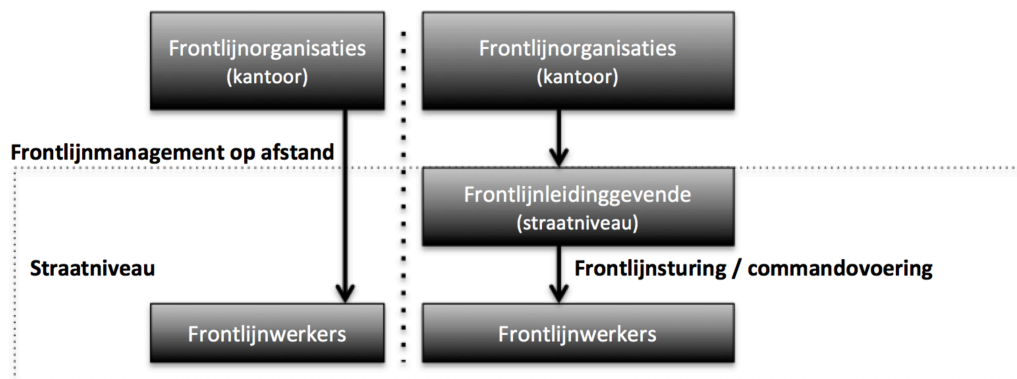
- Weick, K.E. (1988). Enacted Sensemaking in Crisis Situations. *Journal of management studies*, 25(4), 305-317.
- Weick, K.E. (1993). The collapse of sensemaking in organizations: The Mann Gulch disaster. *Administrative science quarterly*, 38, 628-652.
- Weick, K.E. & Sutcliffe, K.M. (2011). *Managing the unexpected: Resilient performance in an age of uncertainty*. John Wiley & Sons.
- Weick, K.E. (2001). Tool retention and fatalities in wildland fire settings: conceptualizing the naturalistic. In: Salas, E. & Klein, G. (Eds). *Linking expertise and naturalistic decision making*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Wheatley, M.J. (2006). *Leadership and the new science: Discovering order in a chaotic world*. San Francisco CA: Berrett-Koehler Publishers, Inc.
- Wiersma, W. (1995). *Research methods in education: An introduction* (Sixth edition). Boston: Allyn and Bacon.
- Wilkinson, S.H. Joffe, L. Yardley, L. (2004). Qualitative data collection: interviews and focus groups. In: Marks, D.F. & Yardley, L. (Eds). *Research Methods for Clinical and Health Psychology*. London: Sage.
- Woerkum, C.M.J. (2011). *Effectieve communicatie. Over het verleidelijke van wensmodellen*. Rede bij het afscheid als hoogleraar Communication Strategies aan de Wageningen Universiteit op 17 november 2011.
- Woods, D. D. & Shattuck, L. G. (2000). Distant supervision—local action given the potential for surprise. *Cognition, Technology & Work*, 2(4), 242-245.
- Yammarino, F. J. & Bass, B.M. (1990). Transformational leadership and multiple levels of analysis. *Human Relations*, 43, 975-995.
- Yin, R. (1984). *Case study research*. Beverly Hills, CA: Sage Publications.
- Yukl, G.A. (1989). *Leadership in Organizations*. (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall.
- Yukl G. (2002). *Leadership in organizations*. Delhi (India): Pearson Education.
- Zsombok, C.E. & Klein, G. (Eds.).(1997). *Naturalistic Decision Making*. Mahwah, NJ: Lawrence Erlbaum Associates.



## Nederlandse samenvatting (summary in Dutch)

### Introductie

In de bestuurswetenschappen wordt al geruime tijd onderzoek verricht naar het functioneren van frontlijnorganisaties, zoals sociale diensten, jeugdzorginstellingen en politie. Kenmerkend aan deze organisaties is dat (a) frontlijnwerkers in direct contact staan met cliënten en andere burgers, (b) de primaire taken doorgaans buiten de organisatie worden uitgevoerd in (c) een steeds wisselende omgeving en (d) de primaire taken moeilijk vooraf te plannen zijn. In frontlijnorganisaties voeren frontlijnwerkers de primaire taken meestal uit zonder de directe aanwezigheid van leidinggevendenden. Het huidige onderzoek heeft zich met name geconcentreerd op de keuzes die frontlijnwerkers in de praktijk maken en de wijze waarop frontlijnorganisaties deze keuzes proberen te beïnvloeden, ook wel frontlijnmanagement genoemd.



**Figuur a:** Twee vormen van frontlijnmanagement

Dit proefschrift gaat over een grotendeels nog onontgonnen gebied in de bestuurswetenschappen, namelijk frontlijnsturing. Sommige frontlijnorganisaties veronderstellen dat directe aansturing van frontlijnwerkers noodzakelijk is voor de effectiviteit van het frontlijnwerk en hebben daartoe frontlijnleidinggevendenden aangesteld. De directe aansturing van frontlijnwerkers door frontlijnleidinggevendenden wordt frontlijnsturing genoemd. Frontlijnsturing kan meer precies gedefinieerd worden als het nemen van beslissingen door leidinggevendenden die zelf ook in de frontlijn staan (frontlijnleidinggevendenden) en die deze beslissingen door frontlijnwerkers moeten laten uitvoeren. Frontlijnsturing onder hoge tijdsdruk staat binnen organisaties zoals defensie en de brandweer beter bekend als commandovoering.

### **Doel- en vraagstelling**

Dit proefschrift onderzoekt frontlijnsturing binnen het deel van de politieorganisatie dat zich bezighoudt met grootschalige opsporing en commandovoering binnen de repressieve brandweerorganisatie. De doelstelling van het proefschrift is tweeledig. Aangezien er nog zeer weinig wetenschappelijk bekend is over frontlijnsturing en commandovoering, probeert dit proefschrift een eerste beeld te geven van de effectiviteit van frontlijnleidinggevenden en commandovoerders. Daarnaast wil dit proefschrift een bijdrage leveren aan de kwaliteit van het toekomstig onderzoek door inzicht te geven in de mate waarin en wijze waarop frontlijnsturing en commandovoering, zowel in een experimentele als natuurlijke omgeving, onderzocht kunnen worden en wat de kracht en beperkingen van verschillende onderzoeksmethoden zijn. Een vergelijkend overzicht van de verschillende methoden om frontlijnsturing en commandovoering te onderzoeken ontbreekt namelijk nog.

De volgende hoofdvraag staat in dit proefschrift centraal:

*Hoe effectief is frontlijnsturing binnen de grootschalige politiële opsporing en commandovoering binnen de repressieve brandweerorganisatie?*

Deze hoofdvraag is onderverdeeld in de volgende deelvragen:

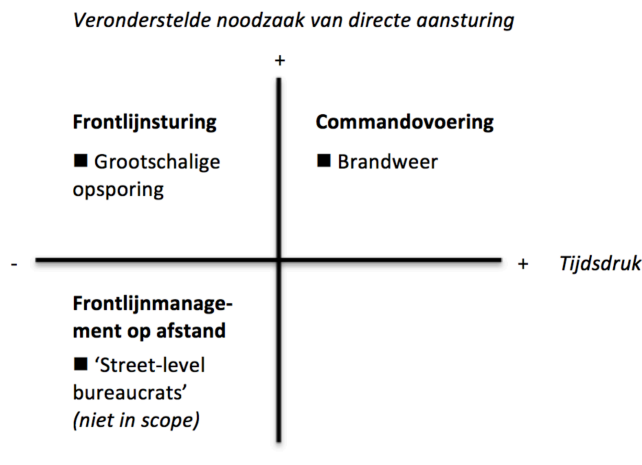
1. Wat is frontlijnsturing?
2. Hoe presteren frontlijnleidinggevenden, hoe kan dit verklaard worden en wat zijn de mogelijke gevolgen?
3. Wat leert het gebruik van verschillende onderzoeksmethoden over de onderzoekbaarheid van frontlijnsturing en commandovoering?

### **Literatuur**

In de bestuurskundige literatuur over frontlijnorganisaties neemt het werk van Michael Lipsky over *'street-level bureaucrats'* een centrale positie in. *Street-level bureaucrats* zijn publieke functionarissen zoals leraren, welzijnswerkers en politieagenten die organisatiebeleid letterlijk op het straatniveau moeten uitvoeren. Hierbij hebben zij veel direct contact met cliënten en andere betrokkenen. Volgens Lipsky is organisatiebeleid vaak abstract en moet op straatniveau worden bepaald hoe dit beleid op concrete gevallen wordt toegepast. *Street-level bureaucrats* hebben hierbij veel vrijheid, omdat de afstand tot leidinggevenden van de organisatie over het algemeen vrij groot is. Managers zijn normaal gesproken namelijk niet bij de uitvoering van het werk op straat aanwezig. Bovendien zijn de kaders waarbinnen *street-level bureaucrats* moeten opereren ruim en de regels waaraan zij zich moeten houden multi-

interpretabil. Het Nederlandse equivalent voor *street-level bureaucrats* is door Casper Hartman en Pieter Tops 'frontlijnwerkers' genoemd.

De afgelopen jaren is in de bestuurskundige literatuur toenemende belangstelling zichtbaar voor het management van frontlijnwerkers en in het bijzonder de vraag hoe managers in frontlijnorganisaties op afstand het frontlijnwerk (kunnen) beïnvloeden. Dit noemen we frontlijnmanagement op afstand. Over de twee andere vormen van frontlijnmanagement is veel minder wetenschappelijk bekend: de directe aansturing van frontlijnwerkers door frontlijnleidinggevenden onder normale tijdsdruk (frontlijnsturing) en de aansturing van frontlijnwerkers door frontlijnleidinggevenden onder hoge tijdsdruk (commandovoering).



**Figuur b:** Een typologie van management in frontlijnorganisaties

#### *Frontlijnmanagement op afstand*

In de literatuur over frontlijnmanagement op afstand zijn verschillende management-instrumenten onderzocht, zoals prestatiesturing, training van frontlijnwerkers, ethische richtlijnen, meer interactie tussen managers en frontlijnwerkers en het implementeren van sanctiebeleid. De meeste literatuur is gebaseerd op vragenlijstonderzoek al dan niet in combinatie met de analyse van prestatiecijfers van organisaties. Deze literatuur suggereert dat de kwaliteit van het frontlijnmanagement in beperkte mate invloed heeft op de keuzes die frontlijnwerkers maken.

### *Frontlijnsturing*

In de wetenschappelijke literatuur is redelijk veel aandacht besteed aan de directe aansturing van uitvoerende medewerkers binnen 'normale' organisaties, maar niet binnen specifiek frontlijnorganisaties. Hartman en Tops, die het begrip frontlijnsturing op de Nederlandse bestuurskundige kaart hebben gezet, hanteren een andere en meer bredere invulling van het begrip. Zij stellen dat bij frontlijnsturing de frontlijn centraal staat bij de inrichting en aansturing van frontlijnwerk, in tegenstelling tot beleidssturing waarbij het opgelegde beleid het vertrekpunt vormt. Specifiek voor de literatuur over de grootschalige opsporing geldt dat tot op heden de nodige aandacht besteed is aan besluitvorming door forensisch onderzoekers- en leidinggevend in laboratoriumomstandigheden. Deze literatuur is gebaseerd op experimenten waarin participanten forensisch bewijs moesten beoordelen dat in sommige gevallen door de onderzoekers gemanipuleerd was of waarbij in andere gevallen contextuele informatie werd aangeboden. Hoewel niet alle onderzoeksresultaten met elkaar in overeenstemming zijn, maakt het meeste onderzoek duidelijk dat forensische besluitvorming gevoelig is voor psychologische factoren en contextuele informatie. Deze uitkomsten zijn alleen nog niet gevalideerd in een, meer op de praktijk lijkende, onderzoeksomgeving. Het tot uitvoering laten brengen van beslissingen binnen de grootschalige opsporing lijkt ook nog niet systematisch onderzocht te zijn.

### *Commandovoering*

Een aspect van commandovoering dat relatief veel wetenschappelijke aandacht heeft gekregen is besluitvorming onder tijdsdruk. Het bekendste resultaat is het model van Gary Klein genaamd 'herkennen doet beslissen', gebaseerd op interviews met voornamelijk brandweerleidinggevend van de brandweer van New York. Het model stelt dat frontlijnleidinggevend onder tijdsdruk geen besloopties met elkaar vergelijken maar op basis van herkenning van de situatie razendsnel tot een oplossing komen die zij in het verleden in een vergelijkbare situatie met succes hebben toegepast. Alleen wanneer de situatie hiertoe aanleiding geeft en er voldoende tijd is, zullen leidinggevend de tijd nemen om de gevolgen van de beslissing te overdenken alvorens ze deze tot uitvoering laten brengen. Meer recent is aandacht besteed in de literatuur aan wat commandovoerders doen wanneer ze de leiding hebben over de incidentbestrijding en waardoor goede commandovoerders zich onderscheiden van minder goede commandovoerders. Hiertoe zijn verschillende onderzoeksmethoden gebruikt, van interviews tot en met participatieve observatie en helmcamera's tijdens zowel oefeningen als echte incidenten. Een belangrijke beperking van dit onderzoek is dat een analyse- en beoordelingskader ontbreekt op basis waarvan het optreden van com-

mandovoerders in beeld gebracht en beoordeeld is. Het onderzoek suggereert dat commandovoerders slechts in beperkte mate sturing (kunnen) geven aan de incidentbestrijding.

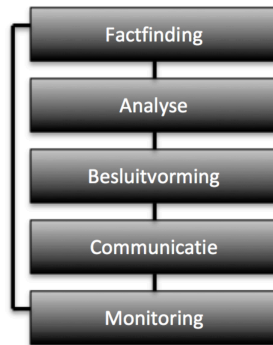
### **Analysekader**

#### *Naar een model van frontlijnsturing*

Om beter inzicht te krijgen in frontlijnsturing en commandovoering zijn bevindingen bij elkaar gebracht uit onderzoek dat bekend staat onder de naam '*Naturalistic Decision Making*' afgekort NDM. NDM-onderzoekers bestuderen hoe professionals beslissingen nemen in omstandigheden die zij in hun dagelijks werk kunnen tegenkomen. NDM-onderzoekers zijn in het bijzonder geïnteresseerd in besluitvorming in taakomgevingen die gekenmerkt worden door tijdsdruk, onvoorspelbaarheid, grote belangen, conflicterende doelen en organisatorische beperkingen. Dit zijn precies de omstandigheden waaronder frontlijnleidinggevenden kunnen opereren.

De NDM-literatuur gaat in op verschillende (deel)aspecten van frontlijnsturing, maar deze inzichten zijn nog niet eerder als zodanig bij elkaar gebracht. In deze thesis zijn daarom de relevante NDM-inzichten bij elkaar gebracht in een model dat beschrijft uit welke verschillende stappen frontlijnsturing (en commandovoering) bestaat. Het cyclische model bestaat uit de, in militaire wetenschappen bekende, stappen Factfinding (het zoeken naar informatie), Analyseren (het analyseren van het probleem), Besluitvorming (het nemen van beslissingen), Communicatie (het formuleren en communiceren van opdrachten) en Monitoring (het toezien op de uitvoering van opdrachten) en heet afgekort FABCM. Bij de bestudering van frontlijnsturing in dit proefschrift zal dit model gebruikt te worden om de bevindingen te kunnen categoriseren.





**Figuur c:** De vijf stappen van het FABCM-model

#### *Methoden van frontlijnonderzoek*

Voor het onderzoeken van de frontlijnpraktijk zijn verschillende onderzoeksmethoden mogelijk: interviews, serious games, vragenlijsten, observatie, participatieve observatie en ten slotte observatie met behulp van helmcamerabeelden. Uit de literatuur is bekend dat iedere onderzoeksmethode zijn eigen kracht en beperkingen kent, maar onduidelijk is nog hoe deze zich manifesteren in het onderzoek naar frontlijnsturing en commandovoering.

In het algemeen wordt vaak aanbevolen om triangulatie van onderzoeksmethoden toe te passen. Dit houdt in dat verschillende (kwalitatieve en/of kwantitatieve) onderzoeksmethoden worden gebruikt in een onderzoek naar hetzelfde fenomeen. Triangulatie kan leiden tot drie verschillende uitkomsten: convergentie (resultaten van verkregen door verschillende onderzoeksmethoden leiden tot dezelfde conclusies), complementariteit (resultaten van verschillende onderzoeksmethoden zijn complementair aan elkaar) en divergentie (resultaten van verschillende onderzoeksmethoden conflicteren met elkaar). In het geval de bevindingen van verschillende onderzoeksmethoden divergeren, zijn er mogelijk methodologische omissies geslopen in de uitvoering van het onderzoek (betrouwbaarheid) of is de onderzoeksmethodiek onvoldoende in staat om het fenomeen te meten (validiteit).

#### *Een analysekader voor de beoordeling van de gebruikte onderzoeksmethoden*

Om de geschiktheid van verschillende onderzoeksmethoden in beeld te brengen, is een analysekader gemaakt waarmee de methodologische kwaliteit van de onderzoeksbevindingen beoordeeld kunnen worden. Het analysekader bestaat uit de vol-

gende criteria: externe betrouwbaarheid (de mate waarin de studie door anderen herhaald kan worden), interne betrouwbaarheid (de mate waarin onderzoekers van het onderzoeksteam hetzelfde waarnemen), construct validiteit (in kwantitatief onderzoek de mate waarin een vragenlijst het concept meet wat het zou moeten meten), interne validiteit (de mate waarin een conclusie bestaande uit een causale relatie tussen twee of meerdere variabelen geldig is), externe validiteit (de mate waarin de resultaten geldig zijn buiten de onderzochte onderzoekspopulatie), ecologische validiteit (de mate waarin de bevindingen verkregen in de onderzoekomgeving geldig zijn in de dagelijkse praktijk), triangulatie (de vraag of bevindingen verkregen met verschillende onderzoeksmethoden convergeren, complementeren of divergeren) en de opinie van respondenten.

#### De verschillende experimenten

Om meer inzicht te krijgen in frontlijnsturing en commandovoering in het algemeen en de onderzoekbaarheid in het bijzonder, zijn in dit proefschrift vijf onderzoeken uitgevoerd naar frontlijnsturing binnen de grootschalige opsporing en commandovoering binnen de repressieve brandweer. Hierbij zijn met behulp van verschillende onderzoeksmethoden één of meerdere aspecten van het FABCM-model onderzocht.

**Tabel a:** De onderzochte FABCM-aspecten per hoofdstuk

	Factfinding	Analyse	Besluitvorming	Communicatie	Monitoring
<b>Empirie</b>					
<b>H3: Forensische besluitvorming coördinatoren</b>	X	X			
<b>H4: Besluitvorming Vaste kernleidinggevenden</b>	X	X	X		
<b>TGO</b>					
<b>H5: Ethisch leiderschap Officieren van Dienst (OvD)</b>				X	
<b>H6: Commandovoering OvD in oefenpraktijk</b>			X	X	X
<b>H7: Commandovoering OvD in echte praktijk</b>			X	X	X

**Tabel b:** De gehanteerde onderzoeksmethoden per hoofdstuk

Empirie	Interviews	Serious game	Vragenlijst	Observatie	Participatieve observatie	Observatie met helmcamera's
H3: Forensische besluitvorming coördinatoren	X	X				
H4: Besluitvorming Vaste kernleiding-gevendens TGO	X	X				
H5: Ethisch leiderschap Officieren van Dienst (OvD)	X		X			
H6: Commandovoering OvD in oefenpraktijk	X			X		X
H7: Commandovoering OvD in echte praktijk	X				X	X

De opzet van de verschillende onderzoeken kan als volgt worden samengevat.

Per experiment zijn verschillende onderzoeksmethoden gebruikt. De per experiment gebruikte onderzoeksmethoden worden in tabel b weergegeven.

### *H3: Forensische besluitvorming door coördinatoren*

Het doel van dit experimentele onderzoek was om te achterhalen in hoeverre forensische besluitvorming beïnvloed wordt door contextuele informatie en emoties in het besluitvormingsproces. Het experimentele onderzoek bestond uit een serious game die op basis van een literatuuronderzoek en interviews was ontwikkeld. De deelnemers aan de serious game werden verdeeld in twee groepen (groep A en B) en moesten de beschikbare onderzoekscapaciteit (in procenten) verdelen over drie verschillende casus. Op enkele aspecten verschilden de drie casus tussen groep A en B: in de ene versie van de casus was een NDM mechanisme verwerkt en in de andere niet. Hierdoor kon het effect van het mechanisme worden vastgesteld. In totaal hebben 98 coördinatoren werkzaam binnen de grootschalige opsporing meegedaan aan de serious game.

#### *H4: Besluitvorming Vaste kernleidinggevenden TGO*

Het doel van dit experimentele onderzoek was om te achterhalen hoe Vaste Kern Leidinggevenden (VKL) Teams Grootchalige Opsporing (TGO) omgaan met tunnelvisie en andere NDM-mechanismen tijdens het oplossen van een moordzaak. Het experimentele onderzoek bestond uit een serious game waarin VKL-teams onder tijdsdruk een moordzaak moesten oplossen. De serious game was ontwikkeld met behulp van een literatuuronderzoek en interviews. Als basis voor de serious game diende het onderzoeksmateriaal uit een bestaand TGO-onderzoek. De serious game bestond uit drie ronden. Tussen iedere ronde moesten de VKL-teams aangeven welke taken zij gingen uitvoeren en de beschikbare onderzoekscapaciteit over deze taken verdelen. Afhankelijk van de uitgezette taken kregen de teams nieuwe informatie. Per ronde zijn de gehanteerde vuistregels, hypothesen en scenario's van de teams bijgehouden. Gekeken is op welke wijze de teams zijn omgegaan met de uit de literatuur bekende NDM-mechanismen die in casus verwerkt zaten. In totaal hebben tien VKL-teams deelgenomen aan de serious game.

#### *H5: Ethisch leiderschap Officieren van Dienst (OvD)*

Het doel van dit onderzoek was om te achterhalen in hoeverre ethisch leiderschap van Officieren van Dienst (OvD) kan helpen om averechts werkgedrag binnen de brandweer te beperken. Het onderzoek bestond uit een vragenlijstonderzoek waarin aan bevelvoerders van één brandweerkorps gevraagd is om aan te geven in welke mate zij averechts werkgedrag vertonen, in hoeverre zij vinden dat een gemiddelde OvD een prototypisch ploeglid is en in hoeverre zij vinden dat een gemiddelde OvD ethisch leiderschap vertoont. In totaal hebben 61 van de 97 bevelvoerders de vragenlijst compleet ingevuld. Deze vragenlijsten zijn vervolgens statistisch geanalyseerd met SPSS. Voor de vragenlijsten is gebruik gemaakt van wetenschappelijk gevalideerde schalen. Aanvullend zijn interviews afgenomen met OvDs om de scores van bevelvoerders beter te kunnen interpreteren.

#### *H6: Commandovoering OvD in de oefenpraktijk*

Het doel van dit onderzoek was om te achterhalen welke bijdrage OvDs van de brandweer leveren aan de veiligheid en effectiviteit van de incidentbestrijding in een oefenomgeving. Het onderzoek bestond uit een analyse van videobeelden gemaakt door een camera op de helm van OvDs tijdens grootschalige oefeningen met nageen hetzelfde oefenscenario. Daarnaast zijn de oefeningen geobserveerd en zijn participanten en oefenstafliden geïnterviewd. Hierbij is geanalyseerd in hoeverre OvDs beslissingen tot uitvoering hebben gebracht die voorafgaand door de oefenstaf

waren benoemd als ‘cruciaal’ voor de veiligheid en effectiviteit van het optreden. In totaal is het optreden van 23 verschillende OvDs bestudeerd.

#### *H7: Commandovoering OvD in de echte praktijk*

Het doel van dit onderzoek was om te achterhalen in hoeverre OvDs van de brandweer bepalen wat er tijdens de incidentbestrijding van ‘echte’ incidenten in de frontlijn wordt gedaan. Het onderzoek bestond uit een analyse van videobeelden gemaakt door een camera op de helm of schouder van OvDs tijdens echte incidenten. Daarnaast is participatief onderzoek uitgevoerd en zijn OvDs geïnterviewd. Gekeken is wat voor besluiten OvDs genomen hebben, hoe zij deze besluiten tot uitvoering hebben gebracht en in welke mate deze besluiten door ondergeschikten zijn uitgevoerd. In totaal deden 9 verschillende OvDs mee aan het onderzoek en zijn in totaal 55 ‘echte’ incidenten onderzocht.

### **De bevindingen**

#### *H3: Forensische besluitvorming coördinatoren*

**Tabel c:** Bevindingen hoofdstuk 3

<b>Inhoudelijke bevindingen</b>	
<b>Factfinding</b>	Tijdens het experiment is een nieuw NDM-mechanisme ontdekt, informatiezucht genaamd. Mogelijk vanuit de aanname dat toeval niet waarschijnlijk is, gaan de coördinatoren er vanuit dat de (toevallige) aanwezigheid van veel informatie over iets ook daadwerkelijk relevant is, ongeacht de relevantie van de initiële informatie. Het gevolg tijdens het experiment was dat de leidinggevendenden geneigd waren om hier extra opsporingscapaciteit op in te zetten.
<b>Analyse</b>	Al langer bekende NDM-mechanismen blijken tijdens het experiment ook van invloed te zijn op de analyse van de coördinatoren. Ten eerste blijkt dat de ethische overtuigingen van teamleiders van invloed zijn op de keuzes die zij maken. Een kindermoord krijgt veel meer onderzoekscapaciteit dan een moord op een prostituee, terwijl het onderzoeksmateriaal identiek is. Ten tweede blijkt dat de context waarin forensisch bewijs gevonden wordt, invloed heeft op de analyse van het bewijsmateriaal. In het experiment werd door coördinatoren meer onderzoekscapaciteit ingezet op de casus

	waarin er door een politieagent tactische (niet geverifieerde) informatie bij het bewijsmateriaal was geleverd.
<b>Methodologische bevindingen</b>	
De deelnemers gaven na afloop aan dat zij zich tijdens het spelen van de serious game niet bewust waren van de ingebouwde NDM-mechanismen. Voor velen waren de resultaten dan ook verrassend, sommigen weigerden zelfs om de resultaten te geloven.	
Triangulatie van de bevindingen van verschillende onderzoeksmethoden laat convergentie zien: het literatuuronderzoek en de interviews geven aanwijzingen dat NDM-mechanismen optreden in de besluitvormingspraktijk van leidinggevendenden binnen de grootschalige opsporing en in de serious game is dit bevestigd. Echter, aangezien de ecologische validiteit van de resultaten verkregen met serious games nog steeds niet optimaal is, is nader participatief onderzoek gewenst. Op basis van dit onderzoek wordt in ieder geval geconcludeerd dat serious games een geschikt instrument zijn om een eerste beeld te kunnen krijgen van de werking van NDM-mechanismen in forensische besluitvorming.	

#### *H4: Besluitvorming Vaste kernleidinggevendenden TGO*

**Tabel d:** Bevindingen hoofdstuk 4

<b>Inhoudelijke bevindingen</b>	
<b>Factfinding</b>	Een omgekeerde variant van informatiezucht (zie ook hierboven) is ontdekt: het blijkt dat wanneer weinig informatie over een potentiële dader gegeven wordt, VKL-teams niet snel geneigd zijn om onderzoekscapaciteit te besteden aan die persoon.
<b>Analyse</b>	De bevindingen zijn dat (a) stereotypen een rol spelen bij het opstellen van hypothesen en scenario's over wat er gebeurd kan zijn; (b) geen enkel VKL-team geprobeerd heeft om hypothesen of scenario's te ontkrachten.
<b>Besluitvorming</b>	Uit de serious game blijkt dat (a) het gevaar van tunnelvisie tijdens het onderzoek onderkend is; (b) besluitvorming door VKL-teams over de inzet van onderzoeksmiddelen zonder bewuste analyse en voornamelijk op basis van herkenning lijkt te gebeuren; (c) de beslissing over wie het gedaan heeft lang wordt uitgesteld door VKL-teams (open focus); (d) politiek/maatschappelijke druk onderkend wordt door de teamleiders en zij ieder op hun eigen wijze maatregelen nemen.

	gelen nemen om dit niet van invloed te laten zijn op de besluitvorming van het team.
<b>Methodologische bevindingen</b>	
<p>Tijdens de interviews met de teams na afloop van de serious game bleek dat de minder ervaren teams de serious game waardeerden als een goede oefening met een hoog realiteitsgehalte. De meer ervaren grootstedelijke VKL-teams zagen echter weinig meerwaarde in de serious game. Zij vonden dat zij al genoeg ervaring in de dagelijkse praktijk opdeden en zagen in de serious game vooral ‘zo doen wij dat hier niet’ aspecten. Een mogelijke verklaring hiervoor is dat de perceptie van de teams over de noodzaak om besluitvorming te trainen met behulp van een serious game invloed heeft op hun beoordeling van de realiteitsgehalte van de game.</p> <p>Triangulatie van de bevindingen van verschillende onderzoeksmethoden leidt tot convergentie. Uit het spelen van de serious game kwam naar voren dat VKL-teams vatbaar zijn voor enkele uit de NDM-literatuur besluitvormingsmechanismen, maar niet tunnelvisie. Deze bevinding komt overeen met de interviews waaruit blijkt dat de teams geen voorbeelden kunnen noemen waarin ze te maken hebben gehad met tunnelvisie.</p> <p>Een voordeel van serious games is dat ze gelijktijdig als trainings- en onderzoeksinstrument ingezet kunnen worden. Bovendien is de betrokkenheid van de deelnemers groot gebleken. Aanvullend participatief onderzoek is echter noodzakelijk om de kritiek van participanten op de realiteitsgehalte van de serious game te kunnen beoordelen. Hierbij dient opgemerkt te worden dat serious games niet de intentie hebben om de volledige werkelijkheid na te bootsen maar slechts enkele cruciale aspecten daarvan. Een bevinding is in ieder geval dat alleen de perceptie van de participanten geen goede graadmeter is om de ecologische validiteit van de serious game te kunnen beoordelen. Alles overziend leidt dit tot de conclusie dat een serious game een geschikte onderzoeksmethode is om een eerste indruk te krijgen van de wijze waarop VKL-teams beslissingen nemen.</p>	

##### *H5: Ethisch leiderschap Officieren van Dienst (OvD)*

**Tabel e:** Bevindingen hoofdstuk 5

<b>Inhoudelijke bevindingen</b>	
<b>Communicatie</b>	In de leiderschapsliteratuur wordt verondersteld dat ethisch leiderschap (gedefinieerd als het vertonen van zichtbaar voorbeeldgedrag, proactief communiceren over morele kwesties en conse-

quent zijn in het belonen en bestraffen van gewenst en ongewenst gedrag) kan helpen om de mate van averechts werkgedrag in (frontlijn)organisaties te beperken. Uit het vragenlijstonderzoek blijkt dat dit inderdaad zo is, maar alleen wanneer de OvDs door bevelvoerders als groepsprototype (van hun ploeg) worden gezien. Groepsprototypische leiders zullen echter niet meer als groepsprototypisch ervaren worden wanneer zij in hun ogen 'onethisch' (dat wil zeggen afwijkend van wat de ploeg wil) ingesloten groepsge-drag ter sprake willen stellen. Aangezien de meerwaarde van frontlijnleidinggevenden is dat zij in bepaalde omstandigheden beslissingen durven te nemen die afwijken van de groep (anders heb je tenslotte geen leidinggevende nodig), is het concept van ethisch leiderschap niet geschikt voor frontlijnleidinggevenden zoals OvDs. Zij moeten bereid zijn om niet prototypisch te handelen en daarmee door ondergeschikten als onethisch leider te worden ervaren. Het gevolg van deze bevinding is dat monitoring van niet groepsprototypische beslissingen door OvDs belangrijk is, omdat bevelvoerders zelf aangeven dat zij in hun ogen 'onethische' beslissingen van OvDs niet zondermeer zullen uitvoeren.

#### **Methodologische bevindingen**

Bevelvoerders en OvDs vonden het onderwerp van het onderzoek nuttig, maar om verschillende redenen. Bevelvoerders vonden het prettig dat ze eens hun verhaal konden doen over het in sommige gevallen 'onethische' gedrag van OvDs. OvDs vonden het onderwerp interessant omdat ze wel benieuwd waren of ze hun stuurvermogen kunnen vergroten wanneer ze meer investeren in individuele relaties met ondergeschikten.

Triangulatie van de bevindingen van verschillende onderzoeksmethoden leidt tot divergentie. In het vragenlijstonderzoek rapporteerden bevelvoerders dat zij nauwelijks averechts werkgedrag vertonen tijdens incidenten. Uit de interviews met OvDs kwam echter een totaal ander beeld naar voren. Volgens deze groep komt averechts werkgedrag regelmatig voor tijdens incidenten, variërend van het niet opschalen tot en met het niet uitvoeren van opdrachten. De literatuur over averechts werkgedrag bevestigde het vermoeden dat in iedere organisatie averechts werkgedrag voorkomt en stelt dat respondenten in vragenlijstonderzoeken over averechts werkgedrag zelden het achterste van hun tong laten zien.

Vragenlijstonderzoek lijkt een minder geschikte methode te zijn om inzicht te krijgen



in het functioneren van frontlijnleidinggevenden. Tijdens het doen van het vooronderzoek bleek bijvoorbeeld dat de wetenschappelijk gevalideerde schalen om ethisch leiderschap te meten door bevelvoerders niet altijd goed begrepen werden en daarom aangepast moesten worden. Daarnaast lijkt het aannemelijk dat respondenten de vragenlijst over averechts werkgedrag niet naar eer en geweten hebben ingevuld: zowel het bagatelliseren als het uitvergroten van averechts werkgedrag lijkt waarschijnlijk. Om beter inzicht te krijgen in averechts werkgedrag in het algemeen en het verschil tussen de zelfrapportage van bevelvoerders en ervaringen van OvDs in het bijzonder, is (aanvullend) participatief onderzoek nodig waarin specifiek aandacht besteed wordt aan contextuele factoren (waarom vinden bevelvoerders een bepaalde beslissing van OvDs in de ene situatie wel ethisch en in een andere situatie niet?), persoonsfactoren (waarom wordt een bepaalde beslissing van de ene leidinggevende wel geaccepteerd en van een andere niet?) en culturele factoren (waarom vindt de ene groep een bepaalde beslissing ethisch en een andere groep een beslissing onethisch?). De conclusie is daarmee dat het uitvoeren van een vragenlijstonderzoek alleen niet geschikt is om ingewikkelde en biasgevoelige onderwerpen zoals averechts werkgedrag en ethisch leiderschap in de frontlijnpraktijk te kunnen onderzoeken. Beter lijkt het om participatieve observatie en helmcamera's te gebruiken.

#### *H6: Commandovoering OvD in de oefenpraktijk*

**Tabel f: Bevindingen hoofdstuk 6**

<b>Inhoudelijke bevindingen</b>	
<b>Factfinding</b>	Uit de helmcamerabeelden blijkt dat OvDs gemiddeld 10 vragen stellen aan bevelvoerders over de aard en omvang van de taakomgeving en 6 vragen over de incidentbestrijding. Het aantal vragen zegt overigens niets over de kwaliteit van de vragen: in veel gevallen zijn de vragen abstract en multi-interpretabel. Uit de beelden blijkt dat OvDs voornamelijk varen op de informatie van bevelvoerders. Slechts 5 van de 23 OvDs voeren zelf een rondom verkenning uit.
<b>Analyse</b>	Uit de helmcamerabeelden blijkt dat OvDs hun analysecapaciteit voornamelijk inzetten om het incident in beeld te brengen met als doel om de taken over de beschikbare eenheden te kunnen verdelen. De geïnterviewde OvDs geven aan dat ze voor deze aanpak gekozen hebben omdat dit conform de

	opleiding is en ze ook hierop worden beoordeeld. Volgens de geïnterviewde OvDs was het niet nodig om de werkzaamheden van bevelvoerders te controleren: na het uitdelen van de opdracht moet vertrouwd kunnen worden op de taakvolwassenheid van bevelvoerders. Uit de helmcamerabeelden blijkt dat deze instelling lang niet altijd terecht is.
<b>Besluitvorming</b>	Het overgrote deel van de kritieke beslissingen is genomen door bevelvoerders. In alle onderzochte nulmetingen is een aantal beslissingen die betrekking had op de veiligheid van het optreden niet genomen door OvDs. OvDs geven nauwelijks opdrachten die afwijken van beslissingen die al eerder door bevelvoerders genomen zijn.
<b>Communicatie</b>	Uit de helmcamerabeelden blijkt dat de OvDs gemiddeld 17 opdrachten hebben gegeven. De meeste opdrachten hebben betrekking op het toewijzen van taken aan bevelvoerders. In bijna alle gevallen voldoen de opdrachten niet aan de vereisten uit de theorie over een goed geformuleerde opdracht (geadresseerd, specifiek en gemotiveerd).
<b>Monitoring</b>	Uit de helmcamerabeelden blijkt dat gemiddeld 4 opdrachten gemonitord zijn door OvDs. In de meeste gevallen is de opdracht gemonitord door een vraag te stellen over de uitvoering zonder dat de OvD direct zicht had op de uitvoering. De vragen die gesteld zijn over de uitvoering waren vaak abstract en multi-interpretabel. De helmcamerabeelden laten zien dat de meeste opdrachten zijn uitgevoerd. Bij twee opdrachten is vastgesteld dat deze niet zijn uitgevoerd zoals opgedragen door de OvD.
<b>Methodologische bevindingen</b>	
De participerende OvDs waren in het algemeen positief over het gebruik van de helmcamera. Ze merkten tijdens de oefening weinig van de camera op de helm en naderhand verschaften de beelden hen inzicht in de wijze waarop ze hadden opgetreden. De meeste OvDs vonden de encenering van de oefening realistisch, in tegenstelling tot het scenario en de hoge tijdsdruk waaronder gewerkt moest worden. Triangulatie van de resultaten van verschillende onderzoeksmethoden leidt tot complementariteit. Helmcamerabeelden leverden een beeld op van het functioneren van OvDs. Interviews gaven inzicht in de motivatie voor het handelen. Tijdens het terug-	

kijken van de filmbeelden bleek dat OvDs zich soms nauwelijks bewust waren van het gedrag dat zij tijdens incidenten vertonen. Dit suggereert dat OvDs dus niet bewust ander gedrag vertonen omdat hun optreden geregistreerd wordt. Observaties gaven de mogelijkheid om het handelen van bevelvoerders te bekijken op het moment dat de OvD nog niet ter plaatse was. Ook kon zo bekeken worden hoe bepaalde taken door bevelvoerders en manschappen werden uitgevoerd. Tijdens de analyse van de resultaten is gebleken dat door betere observatie tijdens de nulmetingen meer relevante data verzameld hadden kunnen worden (bijvoorbeeld de tijd vanaf start oefening dat alle slachtoffers (a) gevonden en (b) gered zijn). Een bevinding is dan ook dat triangulatie van onderzoeksmethoden noodzakelijk is om volledig inzicht te kunnen krijgen in de bijdrage die OvDs leveren aan de veiligheid en efficiëntie van de incidentbestrijding.

Een beperking van het doen van onderzoek in een oefenomgeving is de beperkte ecologische validiteit. De feedback uit een oefenomgeving komt niet altijd overeen met de praktijk. Tijdens interviews gaven bevelvoerders aan dat zij opdrachten van bepaalde OvDs nooit zouden hebben uitgevoerd, maar dit nu wel gedaan hebben omdat het een oefening is. Ook gaven sommige bevelvoerders aan dat zij niet zouden hebben gewacht op een opdracht van de OvD, maar zelf aan de slag zouden zijn gegaan. Een andere beperking is dat OvDs in een oefenomgeving handelen zoals ze denken dat ze moeten handelen van hun observatoren en daardoor niet het gedrag laten zien wat ze in werkelijkheid vertonen. Nulmetingen bieden een kans om commandovoering van verschillende OvDs te kunnen vergelijken en op zoek te gaan naar patronen, zeker wanneer compleet bemande tankautosputen meedoen zoals tijdens de onderzochte nulmetingen het geval was. Een ander voordeel van een oefenomgeving is dat een selectiebias voorkomen kan worden doordat alle OvDs geacht worden om mee te doen aan het experiment. Het gebruik van helmcamera's in een oefensetting kent enkele beperkingen. Ten eerste is de kwaliteit van het beeld en geluid niet altijd even goed, zodat in enkele gevallen de OvD niet te verstaan is of niet zichtbaar is wat bevelvoerders op de achtergrond aan het doen zijn. Ten tweede is inhoudelijke brandweerkennis noodzakelijk om de beelden op een adequate wijze te kunnen interpreteren. Ten derde kan met behulp van helmcamera's alleen dát onderzocht worden wat hoor- en zichtbaar is op de beelden: wat de OvD daadwerkelijk waarneemt, denkt en voelt blijft voor de onderzoeker onduidelijk. Aangezien deze beperkingen opgelost kunnen worden door meerdere camera's en aanvullende onderzoeksmethoden te gebruiken, is de conclusie dat helmcamera's een gedegen inzicht kunnen geven in commandovoering tijdens oefeningen.

## H7: Commandovoering OvD in de echte praktijk

**Tabel g:** Bevindingen hoofdstuk 7

<b>Inhoudelijke bevindingen</b>	
<b>Factfinding</b>	Uit de helmcamerabeelden blijkt dat de onderzochte OvDs voornamelijk reactief reageerden op informatie uit de omgeving (81%) en nauwelijks proactief op zoek zijn gegaan naar relevante informatie.
<b>Analyse</b>	De helmcamerabeelden laten zien dat in de meeste gevallen OvDs vrijwel direct na het krijgen of vinden van informatie een beslissing namen. Dit suggereert besluitvorming op basis van herkenning in tegenstelling tot besluitvorming op basis van een bewuste afweging.
<b>Besluitvorming</b>	Uit de helmcamerabeelden blijkt dat gemiddeld 1 opdracht per onderzocht incident gegeven is. 71% van de opdrachten heeft betrekking op de incidentbestrijding en 29% op de veiligheid. Het merendeel van de opdrachten is gegeven bij drie grotere incidenten. In de meeste onderzochte incidenten hebben de OvDs geen expliciete opdrachten gegeven. De onderzochte OvDs geven nauwelijks opdrachten die afwijken van beslissingen die al eerder door bevelvoerders genomen zijn.
<b>Communicatie</b>	Uit de helmcamerabeelden blijkt dat de formulering van veel opdrachten niet voldoet aan de vereisten uit de theorie over een goed geformuleerde opdracht.
<b>Monitoring</b>	Geen enkele onderzochte OvD blijkt gecontroleerd te hebben of de gecommuniceerde opdracht door de bevelvoerder is begrepen. In het merendeel van de gevallen (57%) is de gecommuniceerde opdracht niet gemonitord door de onderzochte OvDs. Van alle gecommuniceerde opdrachten is 21% niet uitgevoerd zoals opgedragen door de OvD. Er is geen correlatie gevonden tussen het wel/niet monitoren van opdrachten en het wel/niet uitvoeren van opdrachten.
<b>Methodologische bevindingen</b>	
De participerende OvDs waren positief over het gebruik van een helmcamera tijdens echte incidenten, omdat dit hun de mogelijkheid gaf om te kunnen reflecteren op het	

eigen optreden.

Triangulatie van de verschillende onderzoeksbevindingen leidt tot complementariteit. De analyse van de filmbeelden leverde bevindingen op die in lijn zijn met het zeer beperkte bestaande onderzoek naar commandovoering. Uit de interviews bleek dat OvDs soms een perceptie hebben over hun optreden die niet overeenkomt met de helmcamerbeelden. Een belangrijke bevinding is dan ook dat enkel het interviewen van OvDs niet afdoende lijkt te zijn om een gedegen inzicht te krijgen van commandovoering in de echte praktijk. De participatieve observatie van enkele OvDs geeft de indruk dat de aangeleverde filmbeelden van de OvDs een doorsnee vormen van de incidenten die deze OvDs in de praktijk meemaken en de wijze waarop zij in de praktijk acteren. Het gebruik van helmcamera's als primaire dataverzamelmethode bij echte incidenten kent echter wel enkele beperkingen. De voornaamste is dat er sprake kan zijn van een selectiebias, aangezien de deelnemers zichzelf (vrijwillig) konden opgeven en bovendien zelf konden bepalen welke beelden zij wilden vrijgeven. Daarnaast zijn aanvullende onderzoeksmethoden gewenst om meer inzicht te krijgen in de effecten van het optreden. Overall leidt dit tot de conclusie dat helmcamera's een geschikte onderzoeksmethode kunnen zijn om inzicht te krijgen in de dagelijkse praktijk van frontlijnleidinggevenden.

### Antwoorden op de onderzoeksvragen

Frontlijnsturing en commandovoering zijn tot op heden nog maar zeer beperkt wetenschappelijk onderzocht. Dit proefschrift probeert een eerste inzicht te geven in frontlijnsturing en commandovoering in het algemeen en de onderzoekbaarheid ervan in het bijzonder.

De **eerste deelvraag** van het proefschrift was 'wat is frontlijnsturing'? Frontlijnsturing is de directe aansturing van frontlijnwerkers door frontlijnleidinggevenden. Meer precies is frontlijnsturing in dit proefschrift gedefinieerd als het nemen van beslissingen door leidinggevenden die zelf ook in de frontlijn staan (frontlijnleidinggevenden) en die deze beslissingen door frontlijnwerkers moeten laten uitvoeren. Frontlijnsturing onder hoge tijdsdruk wordt commandovoering genoemd. Op basis van de wetenschappelijke literatuur zijn vijf elementen van frontlijnsturing geïdentificeerd: factfinding, analyse, besluitvorming, communicatie en monitoring (FABCM).

De **tweede deelvraag** van het proefschrift was ‘hoe presteren frontlijnleidinggeven- den, hoe kan dit verklaard worden en wat zijn de mogelijke gevolgen?’ Deze deelvraag kan per FABCM-element worden beantwoord.

### *Factfinding*

**Tabel h:** Overall bevindingen factfinding

<i>Overall bevinding</i>	Uit de verschillende empirische onderzoeken blijkt dat de hoeveelheid informatie een sturende rol kan spelen in de besluitvorming van frontlijnleidinggeven- den. Deze bevinding past bij eerder NDM-onderzoek maar lijkt nog niet als zodanig te zijn beschreven. Het blijkt dat frontlijnleidinggeven- den in de verschillende experi- mentele onderzoeken vooral gehandeld hebben op basis van in- formatie die zij (toevallig) vinden. Vinden ze veel informatie over iets dan zoeken ze hierop verder, ongeacht de relevantie van de initiële informatie. Als er weinig informatie wordt aangeboden dan is de kans klein dat deze informatie aanleiding geeft tot ver- der zoeken. Dit mechanisme is ‘informatiezucht’ genoemd. Daar- naast lijkt het erop dat frontlijnleidinggeven- den in de verschillen- de experimentele onderzoeken heel moeilijk konden ontsnappen van de informatie die zij uit hun omgeving krijgen. Zelden is waar- genomen in de verschillende experimentele onderzoeken dat frontlijnleidinggeven- den uit zichzelf op zoek zijn gegaan naar in- formatie zonder dat de omgeving hiertoe aanleiding gaf. Uit de experimentele onderzoeken blijkt bovendien dat frontlijnleiding- geven- den vaak blind varen op de informatie van frontlijnwerkers. Zij lijken zich niet altijd bewust van de unieke mogelijkheden die zij hebben om zich bezig te houden met omgevingsaspecten die frontlijnwerkers gemakkelijk kunnen missen.
<i>Wat zijn moge- lijke verklarin- gen?</i>	Een mogelijke verklaring voor het reactief reageren op informatie uit de omgeving is dat de omgeving dermate veel attractieve prik- kels kent waar frontlijnleidinggeven- den menen op te moeten reageren, dat zij niet meer toekomen aan het proactief zoeken van informatie. Een andere verklaring is dat frontlijnleidinggeven- den door een gebrek aan ervaring niet weten naar welke informa- tie ze proactief moeten zoeken. Een vuistregel die frontlijnleiding-

	geven mogelijk op basis van hun ervaring onbewust gebruiken, is dat informatie vanuit de omgeving vaak relevant is en daarom aandacht heeft.
<i>Wat zijn de mogelijke gevolgen?</i>	In de meeste gevallen lijkt de wijze waarop frontlijnleidinggeven omgaan met informatie te leiden tot bevredigende beslissingen. Echter, in de gevallen dat frontlijnwerkers de situatie verkeerd beoordelen, moeten frontlijnleidinggeven dit kunnen herkennen en corrigeren. Hiertoe moeten ze op zoek gaan naar informatie die frontlijnwerkers geneigd zijn over het hoofd te zien. Wanneer frontlijnleidinggeven voornamelijk gebruik maken van de informatie die ze uit de frontlijn krijgen, kan niet van hen verwacht worden dat zij in uitzonderingsgevallen in staat zijn om frontlijnwerkers betere beslissingen te laten nemen.

### Analyse

**Tabel i:** Overall bevindingen analyse

<i>Overall bevinding</i>	De experimentele onderzoeken geven de indruk dat de analyse van informatie door frontlijnleidinggeven in de meeste gevallen vrij onbewust plaatsvindt, dus zonder dat overwegingen expliciet gemaakt worden of dat hieraan een discussie vooraf gaat. Aannames worden zelden expliciet gemaakt. Daarnaast blijkt dat NDM-mechanismen zoals stereotypen en emoties de analyse van frontlijnleidinggeven in de verschillende experimentele onderzoeken beïnvloed hebben. De onderzochte frontlijnleidinggeven blijken zich hier niet altijd van bewust.
<i>Wat zijn mogelijke verklaringen?</i>	De meest plausibele verklaring is dat de snelle, intuïtieve manier van beslissen vaak leidt tot bevredigende resultaten. Daarnaast lijkt in opleiding en training van frontlijnleidinggeven weinig aandacht besteed te worden aan de invloed van contextuele factoren en eigen overtuigingen op frontlijnbesluitvorming.
<i>Wat zijn de mogelijke gevolgen?</i>	Intuïtieve besluitvorming kan in bijzondere gevallen tot onbevredigende beslissingen leiden. Bij een gebrek aan praktijkervaring is de kans groot dat aangeleerde vuistregels onterecht of verkeerd worden toegepast. Frontlijnleidinggeven kunnen bovendien vaak pas het verschil maken wanneer zij in tegenstelling tot hun

	frontlijnwerkers een meer analytische besluitvormingsmodus gebruiken (mentale simulatie genaamd in het 'herkennen doet beslissen' model).
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### *Besluitvorming*

**Tabel j:** Overall bevindingen besluitvorming

<i>Overall bevinding</i>	De overall bevindingen suggereren dat frontlijnleidinggevenden het lastig lijken te vinden om fundamentele beslissingen te nemen. Uit de experimentele onderzoeken blijkt dat in het geval van de grootschalige opsporing de besluitvorming over potentiële daders lang wordt opgerekt met als doel om tunnelvisie te voorkomen. Binnen de onderzochte brandweerpraktijk is zichtbaar dat de meeste beslissingen door frontlijnwerkers (bevelvoerders en manschappen) genomen worden. Daarnaast blijkt dat frontlijnleidinggevenden nauwelijks opdrachten geven die afwijken van al eerder genomen beslissingen door frontlijnwerkers. Bij de grootschalige opsporing lijkt hetzelfde zichtbaar: wanneer frontlijnleidinggevenden veel informatie krijgen over iets, lijken zij het moeilijk te vinden om daar geen opvolging aan te geven. Andersom lijken zij het ook moeilijk te vinden om onderzoekscapaciteit in te zetten op een potentiële dader die door hun frontlijnwerkers nog niet echt prominent naar voren is geschoven.
<i>Wat zijn mogelijke verklaringen?</i>	Een mogelijke verklaring is dat frontlijnleidinggevenden gevoeliger zijn voor het voorkomen van fouten dan het verbeteren van efficiëntie van het frontlijnwerk. Bovendien lijkt de noodzaak tot het nemen van afwijkende beslissingen in de praktijk zeldzaam te zijn en tijdens oefeningen nauwelijks behandeld te worden.
<i>Wat zijn de mogelijke gevolgen?</i>	Het niet of laat nemen van fundamentele beslissingen kan leiden tot een verlies aan efficiency en effectiviteit. Dit is problematisch aangezien de meeste frontlijnorganisaties over een beperkte hoeveelheid (hoofdzakelijk publieke) middelen beschikken.



## Communicatie

**Tabel k:** Overall bevindingen communicatie

<i>Overall bevinding</i>	Uit de onderzoeken komt naar voren dat ondanks de vaak gebrekkige formulering van opdrachten de meeste wel op een bevredigende wijze uitgevoerd (lijken te) worden. Dit impliceert dat de wijze waarop opdrachten uitgevoerd worden in de meeste gevallen meer afhankelijk is van de kennis en ervaring van frontlijnwerkers dan van de sturing door frontlijnleidinggevenden. Hierbij spelen twee problemen. Enerzijds lijken frontlijnwerkers onvoldoende te beseffen dat frontlijnleidinggevenden hen kunnen helpen door in sommige gevallen beslissingen te nemen die zij als 'onethisch' beschouwen. Anderzijds lijken frontlijnleidinggevenden onvoldoende te beseffen dat zij soms beslissingen moeten nemen die als onethisch zouden kunnen worden beschouwd.
<i>Wat zijn mogelijke verklaringen?</i>	De meest plausibele verklaring is dat frontlijnleidinggevenden en frontlijnwerkers over vergelijkbare mentale modellen beschikken. Hierdoor zijn frontlijnwerkers in staat om zonder het krijgen van heldere opdrachten toch bevredigende beslissingen te nemen die aansluiten bij de doelstelling van de frontlijnleidinggevende. Een verklaring voor de gebrekkige formulering van opdrachten is dat er in opleiding en training nauwelijks aandacht voor lijkt te zijn.
<i>Wat zijn de mogelijke gevolgen?</i>	In uitzonderingsgevallen geldt dat een gebrekkig geformuleerde opdracht verkeerd begrepen kan worden met onbevredigende resultaten als gevolg.

## Monitoring

**Tabel l:** Overall bevindingen monitoring

<i>Overall bevinding</i>	Uit de onderzoeken blijkt dat het merendeel van de opdrachten niet wordt gemonitord. Echter, uit de onderzoeken blijkt dat het soms wenselijk is dat frontlijnleidinggevenden de handelingen van frontlijnwerkers bijsturen. Opdrachten worden lang niet altijd naar behoren uitgevoerd en soms blijkt kritieke informatie van frontlijnwerkers onjuist te zijn. Ook de bevinding dat als onethisch beschouwde opdrachten van frontlijnleidinggevenden niet zonder
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	meer uitgevoerd worden (zie hierboven), noopt tot het monitoren van opdrachten.
<i>Wat zijn mogelijke verklaringen?</i>	Een typische NDM-verklaring is dat het niet monitoren van beslissingen vaak geen negatieve gevolgen heeft. Het blijkt bovendien dat frontlijnleidinggevendenden in het algemeen een groot vertrouwen hebben in de taakvolwassenheid van frontlijnwerkers. Gericht toezicht op een correcte uitvoering van opdrachten wordt dan ook niet als noodzakelijk beschouwd.
<i>Wat zijn de mogelijke gevolgen?</i>	De kans is groot dat opdrachten van frontlijnleidinggevendenden, die afwijken van de dagelijkse routine van frontlijnwerkers, niet of niet naar behoren worden uitgevoerd. In sommige gevallen kan dit ervoor zorgen dat het incident of onderzoek niet effectief wordt opgelost. Of erger, het leidt tot ongevallen onder het eigen personeel. Een ander probleem van het niet monitoren van opdrachten is dat frontlijnwerkers geen tijdige feedback krijgen op de handelingen die ze verrichten.

De **derde deelvraag** van het proefschrift was ‘wat leert het gebruik van verschillende onderzoeksmethoden over de onderzoekbaarheid van frontlijnsturing en commandovoering?’

De methodologische bevindingen van de verschillende (experimentele) onderzoeken maken duidelijk dat één onderzoeksmethode onvoldoende is om een adequaat inzicht te krijgen in het functioneren van frontlijnleidinggevendenden. Door verschillende onderzoeksmethoden te combineren kunnen inhoudelijk rijkere en methodologisch hoogwaardigere resultaten verkregen worden. Serious games, (participatieve) observatie en het gebruik van helmcamera's zijn methoden waarmee aspecten van frontlijnsturing onderzocht kunnen worden.

Een belangrijke bevinding is dat interviews en vragenlijstonderzoek niet geschikt lijken te zijn als primaire onderzoeksmethoden bij het doen van onderzoek naar het functioneren van frontlijnleidinggevendenden. Gebleken is namelijk dat frontlijnleidinggevendenden soms een andere perceptie hebben van wat er is gebeurd dan uit de helmcamerabeelden blijkt. Deze bevinding heeft praktische implicaties aangezien veel evaluatieonderzoek naar het functioneren van frontlijnorganisaties primair gebaseerd is op interviews. De aanbeveling voor evaluatieonderzoekers is dan ook om zoveel mogelijk

databronnen met elkaar te vergelijken en verklaringen van frontlijnleidinggevenden en frontlijnwerkers met elkaar te confronteren. Specifiek voor vragenlijsten geldt dat de betrouwbaarheid van de bevindingen beperkt is, aangezien er talloze biases zijn die maken dat respondenten de vragen niet overeenkomstig de werkelijkheid zullen beantwoorden.

Uit dit proefschrift blijkt dat de frontlijnpraktijk zich niet gemakkelijk openbaart voor frontlijnonderzoekers, maar wel op een bevredigende wijze te onderzoeken is. Een gedegen inzicht in deze praktijk vergt een onderzoeksopzet bestaande uit meerdere onderzoeksmethoden en is daarmee intensief en relatief kostbaar. Bovendien vraagt het om medewerking vanuit de frontlijnpraktijk bij de ontwikkeling van- en deelname aan experimenten. De intensiteit, kosten en medewerking van het veld verklaren mogelijk waarom er nog zeer beperkt onderzoek verricht is naar het functioneren van frontlijnleidinggevenden.

De **hoofdvraag** van dit proefschrift was ‘hoe effectief is frontlijnsturing binnen de grootschalige politiële opsporing en commandovoering binnen de repressieve brandweerorganisatie?’ Op basis van de drie deelvragen kan de hoofdvraag als volgt beantwoord worden.

Frontlijnorganisaties zoals de repressieve brandweer en de grootschalige opsporing veronderstellen dat frontlijnsturing en commandovoering door frontlijnleidinggevenden onder bepaalde omstandigheden noodzakelijk is om het frontlijnwerk effectief uit te kunnen voeren. Dit proefschrift suggereert dat de betekenis van frontlijnleidinggevenden in de onderzochte frontlijnpraktijk veel minder groot is dan frontlijnorganisaties geloven en daarmee uitstralen. Gebleken is namelijk dat de besluitvorming van frontlijnleidinggevenden door verschillende mechanismen beïnvloed worden. Deze mechanismen kunnen leiden tot suboptimale beslissingen met als mogelijk gevolg een inefficiënt en ineffectief frontlijnoptreden. Frontlijnleidinggevenden lijken bovendien niet snel geneigd te zijn om beslissingen te nemen die afwijken van beslissingen die frontlijnwerkers meestal nemen. Daarnaast blijkt dat de uitvoering van genomen beslissingen vaak gebrekkig is. De gedachte dat frontlijnleidinggevenden (kunnen) bepalen wat er allemaal in de frontlijn gebeurt, blijkt op basis van dit proefschrift een illusie te zijn.

## **Praktische implicaties**

De bevindingen van dit proefschrift hebben meerdere implicaties voor frontlijnorganisaties.

Frontlijnleidinggevenden blijken zichzelf vaak niet bewust van de valkuilen in hun besluitvorming en de wijze waarop zij beslissingen tot uitvoering proberen te brengen. De noodzaak om de vijf FABCM-stappen te volgen bij het geven van sturing lijkt nog onvoldoende te worden onderkend. Betere opleiding en training aan de hand van NDM-inzichten die zijn samengebracht in het FABCM-model lijken het bewustzijn in de valkuilen te kunnen vergroten. Essentieel hierbij is dat frontlijnleidinggevenden leren begrijpen dat het noodzakelijk kan zijn om af te moeten wijken van beslissingen die door frontlijnwerkers als vanzelfsprekend worden ervaren. Dit is geen gemakkelijke opgave omdat het lastig in een oefenomgeving te leren valt. Wanneer tegenspelers in een oefenomgeving zich namelijk atypisch gaan gedragen, is de kans groot dat de oefenomgeving door frontlijnleidinggevenden als onrealistisch ervaren wordt en de motivatie om te oefenen afneemt.

Een bijkomstig probleem is dat frontlijnwerkers waarschijnlijk niet zitten te wachten op afwijkende opdrachten in het algemeen of een 'bemoeizuchtige' frontlijnleidinggevende in het bijzonder. Er lijkt wel draagvlak te bestaan voor frontlijnleidinggevenden, maar alleen wanneer ze beslissingen nemen die het frontlijnwerk 'in hun ogen' ten goede komen. Frontlijnwerkers hebben niet altijd in de gaten dat dit juist kan betekenen dat frontlijnleidinggevenden soms beslissingen moeten nemen die afwijken van de beslissingen die zij normaliter zouden nemen. Frontlijnwerkers lijken niet altijd te beseffen dat frontlijnleidinggevenden, als gevolg van verschillende psychologische mechanismen, soms een betere kijk op het uitvoerende werk hebben en daardoor andere beslissingen nemen.

Hoewel frontlijnsturing en commandovoering in de onderzochte praktijk weinig betekenis lijken te hebben, blijft de vraag overeind staan of en hoe leidinggevenden in de frontlijn van meer betekenis zouden kunnen zijn.

Theoretisch en in de praktijk zijn er voldoende situaties te bedenken respectievelijk waar te nemen waarin frontlijnleidinggevenden het verschil kunnen maken door besluitvormings- en uitvoeringsvalkuilen bij henzelf en ondergeschikten te herkennen en te corrigeren. Met andere woorden: de frontlijn functioneert niet altijd

optimaal en frontlijnleidinggevenden zouden (maar doen dat nu slechts in beperkte mate) een gebrek aan kwaliteit in de frontlijn kunnen compenseren.

Om deze theoretische meerwaarde te kapitaliseren, is het nodig dat er frontlijnleidinggevenden 'nieuwe stijl' komen die onder andere intensief getraind en geoefend moeten worden. Dit roept dan echter wel meteen de vraag op voor frontlijnorganisaties hoe zij hun (opleidings- en trainings)budget het beste kunnen besteden: willen ze a) investeren in frontlijnleidinggevenden die in uitzonderlijke situaties het verschil moeten maken of zetten ze b) in op een verbetering van de kennis en ervaring van frontlijnwerkers zodat die vaker het goede doen en 'dan maar' in die uitzonderlijke gevallen falen?

Indien gekozen wordt om te investeren in betere frontlijnleidinggevenden, dan betekent dit tenminste aandacht voor twee aspecten.

Ten eerste zal helderheid verschaft moeten worden over de taken en doelstelling van frontlijnleidinggevenden. Uit deze thesis blijkt dat frontlijnleidinggevenden binnen de grootschalige opsporing voortdurend geconfronteerd worden met de spanning tussen voorzorg (het voorkomen van fouten) en efficiëntie (het zo effectief mogelijk inzetten van vaak schaarse middelen). Deze thesis laat zien dat frontlijnleidinggevenden in de huidige praktijk de neiging hebben om te kiezen voor voorzorg, met negatieve consequenties voor de efficiëntie. De discussie die frontlijnorganisaties daarom met interne en externe stakeholders moeten voeren is wat een goede balans is tussen voorzorg en daadkracht. Het resultaat van deze discussie moet input vormen voor een heldere taakomschrijving van frontlijnleidinggevenden.

Ten tweede zullen frontlijnorganisaties moeten zorgen voor de juiste randvoorwaarden zodat frontlijnleidinggevenden adequaat kunnen opereren. Dit betekent niet alleen het zorgdragen voor een intensief opleidings- en trainingsprogramma voor frontlijnleidinggevenden (met als doel om de formele kennis en stuurvaardigheden van frontlijnleidinggevenden te vergroten). Het vergt ook dat frontlijnleidinggevenden een ruim mandaat krijgen om tijdens de incidentbestrijding of het grootschalig onderzoek beslissingen te nemen. Senior management moet deze beslissingen achteraf openlijk steunen. En het vergt het besef dat de (koude) organisatie afgestemd moet zijn op de warme (respons) organisatie. Dit betekent bijvoorbeeld dat frontlijnleidinggevenden ook tijdens niet-incidenten hiërarchisch bovengeschiedt zijn aan de frontlijnwerkers aan wie ze tijdens incidenten of onderzoeken leiding geven. Daarnaast

moeten frontlijnorganisaties hun operationele procedures zodanig inrichten dat frontlijnleidinggevenden veel meer ervaringskennis kunnen opdoen.

Meer specifiek doet dit proefschrift de volgende aanbevelingen aan de politieorganisatie die verantwoordelijk is voor de grootschalige opsporing:

- Besteed aandacht aan NDM-mechanismen in opleiding en training;
- Organiseer de uitwisseling van kennis, bijvoorbeeld door uitwisseling van frontlijnleidinggevenden tussen verschillende eenheden te stimuleren;
- Verschaf helderheid over de doelstelling van frontlijnsturing.

De volgende aanbevelingen hebben specifiek betrekking op de repressieve brandweerorganisatie:

- Selecteer frontlijnleidinggevenden die zich minder snel conformeren aan de sociale normen en waarden van de groep (en die het dus niet erg vinden om niet aardig gevonden te worden) én die het mentale vermogen hebben om onder tijdsdruk analytisch te kunnen blijven nadenken;
- Herzie de wijze waarop frontlijnleidinggevenden opgeleid en getraind worden;
- (voor frontlijnleidinggevenden): Focus je tijdens de incidentbestrijding op datgene waar je het verschil kunt maken als frontlijnleidinggevende.
- (voor senior management): Laat openlijk zien dat je beslissingen van frontlijnleidinggevenden steunt, zowel vooraf als achteraf.

De bevindingen van dit proefschrift hebben ook een specifieke implicatie voor de organisatie van de crisisbeheersing in westerse landen waaronder Nederland. Verondersteld wordt dat het mogelijk is om in de acute fase van crises frontlijnwerkers (en leidinggevenden!) van bovenaf aan te sturen door middel van een drielagen commandovoeringmodel (COPI-ROT-BT). Dit proefschrift maakt duidelijk dat van deze veronderstelling niet teveel verwacht mag worden tijdens de acute fase van crises, omdat frontlijnleidinggevenden het frontlijnwerk slechts in beperkte mate lijken te kunnen beïnvloeden. Het lijkt daarom beter maar ook onontkoombaar om frontlijnwerkers te leren dat zij tijdens crises in eerste instantie zelfsturend moeten opereren.

### **Implicaties voor vervolgonderzoek**

Dit proefschrift maakt duidelijk dat de toevoegde waarde van frontlijnleidinggevenden voor de uitvoering van het frontlijnwerk zich niet gemakkelijk laat vaststellen, maar dat door de toepassing van meerdere onderzoeksmethoden het mogelijk is om

frontlijnsturing op een adequate wijze te onderzoeken. Bovendien blijkt meer inzicht in de betekenis van frontlijnsturing voor frontlijnwerk wetenschappelijk en maatschappelijk relevant te zijn. De vraag wat nu precies de toegevoegde waarde is van frontlijnleidinggevenden voor het frontlijnwerk verdient daarom nader onderzoek.

Om deze vraag adequaat te kunnen beantwoorden, moeten verschillende stappen gezet worden:

1. Om de prestaties van de frontlijn mét en zonder frontlijnleidinggevenden te kunnen beoordelen, moet ten eerste een analyse- en beoordelingskader opgesteld worden. Dit kader moet inzicht geven in de volgende aspecten: de prestaties van de frontlijn (bijvoorbeeld aantal succesvolle opsporingen en vervolgingen of het aantal geredde slachtoffers), kenmerken van de taakomgeving (bijvoorbeeld aantal taken en complexiteit), kenmerken van frontlijnleidinggevenden (bijvoorbeeld ervaring met de uit te voeren taken) en kenmerken van frontlijnwerkers (ibidem).
2. Het analyse- en beoordelingskader moet getest worden in een experimentele omgeving waarbij frontlijnwerkers in de ene conditie taken uitvoeren zonder frontlijnleidinggevende en in de andere conditie met een frontlijnleidinggevende. In het geval van de grootschalige opsporing zou dit bijvoorbeeld kunnen betekenen dat Vaste Kern Uitvoerenden (VKU) een serious game spelen waarbij ze een TGO-waardige casus moeten oplossen. In de ene conditie moeten zij dit zelfstandig doen en in de andere conditie onder aansturing van een VKL team. In het geval van de repressieve brandweerorganisatie kan inzicht worden verkregen in de effecten van frontlijnleidinggevenden door bijvoorbeeld een serie grootschalige oefeningen met en zonder OvD te organiseren. Het analyse- en beoordelingskader moet de resultaten van de twee condities in beeld brengen. Deze resultaten kunnen enerzijds gebruikt worden om het kader te verfijnen en anderzijds dienen ze als input voor vervolgonderzoek.
3. Om de gevonden resultaten te kunnen valideren met de dagelijkse praktijk, is het aan te bevelen om pilots uit te voeren binnen frontlijnorganisaties waarbij verschillende varianten van frontlijnsturing worden getest. In het geval van de grootschalige opsporing zou dit bijvoorbeeld kunnen betekenen dat in een regionale eenheid een pilot wordt uitgevoerd waarbij TGO-waardige delicten niet door een volledig VKL-team worden aangestuurd, maar door één of twee personen. Het analyse- en beoordelingskader moet vervolgens gebruikt worden om de resultaten van de pilot te vergelijken met die van vergelijkbare zaken die door een volledig VKL-team zijn behandeld. Binnen de repressieve brandweerorganisatie zou dit kunnen inhouden dat drie gelijkwaardige districten worden uitgekozen waarbij

met verschillende inzetvarianten wordt gewerkt: in het eerste district rukt de OvD uit naar alle incidenten, in het tweede district gaat de OvD alleen naar grotere of complexere incidenten (huidige situatie) en in het derde district rukt er geen OvD uit. Toegegeven, dergelijk onderzoek zal niet gemakkelijk te realiseren zijn, al was het maar omdat bijvoorbeeld de komst van de OvD bij incidenten wettelijk vastgelegd is.

4. Bij het beoordelen van de bevindingen die verkregen zijn met het analyse- en beoordelingskader moet rekening gehouden worden met de mogelijke lange termijn effecten van frontlijnleidinggeevenden. Het zou bijvoorbeeld kunnen zijn dat frontlijnwerkers pas beter gaan presteren zonder frontlijnleidinggeevenden wanneer zij gewend zijn om zonder te moeten opereren. Idealiter moeten de experimenten daarom over een langere periode worden uitgevoerd waarbij meerdere meetmomenten worden gekozen. Langjarig onderzoek is bovendien nodig om data van verschillende incidenten en grootschalige onderzoeken te verzamelen. Dit laatste maakt het mogelijk om de invloed van contextuele variabelen op de prestaties van frontlijnwerkers en leidinggeevenden naar de voorgrond te krijgen.

De volgende vragen kunnen behulpzaam zijn bij het analyseren van de verkregen data:

*FABCM-aspecten in relatie tot kenmerken van frontlijnleidinggeevenden.* In hoeverre heeft de ervaring van frontlijnleidinggeevenden met het type incident invloed op de wijze waarop ze invulling geven aan de B-C-M-aspecten van het FABCM-model? In hoeverre kunnen FABCM-aspecten aangeleerd worden?

*FABCM-aspecten in relatie tot kenmerken van frontlijnwerkers.* Is een andere wijze van communicatie noodzakelijk bij ervaren of minder ervaren frontlijnwerkers? En heeft het dienstverband (beroeps of vrijwillig dienstverband) nog invloed op de wijze waarop frontlijnwerkers moeten worden aangestuurd?

*FABCM-aspecten in relatie tot kenmerken van frontlijnorganisaties.* Hebben cultuur en techniek invloed op de wijze waarop door frontlijnleidinggeevenden met FABCM-aspecten wordt omgegaan? In hoeverre zijn digitale middelen behulpzaam voor B- en C-aspecten tijdens de incidentbestrijding?



*FABCM in relatie tot de effectiviteit van frontlijnsturing en de incidentbestrijding.* In welke mate gaan frontlijnleidinggevendenden daadwerkelijk beter presteren wanneer zij modellen zoals het FABCM-model gaan gebruiken? En in hoeverre leidt betere commandovoering tot een betere incidentbestrijding?

Wanneer beter inzicht is verkregen in het functioneren en de effecten van frontlijnsturing binnen de grootschalige opsporing en de repressieve brandweer, is vergelijkend onderzoek gewenst naar de verschillen tussen deze en andere frontlijnorganisaties. Waarom werkt het concept van frontlijnsturing wel in de ene maar niet in de andere organisatie? In welke mate is er frontlijnsturing aanwezig bij bijvoorbeeld traumateams? Hoe vindt frontlijnsturing plaats in organisaties die werken met risicovolle productieprocessen? En wat kunnen politie en brandweer hier van leren? En andersom?

## Appendix: case descriptions serious game forensic decision making

### Micro Electric

	Group A	Group B
T = 0	A mobile phone shop, carpet store and a small administrative office are all located in one building. The shop is located on the ground floor, the carpet store and administration office on the second floor. Unfortunately, the building was burned out.	Ibid.
	The fire was reported to the fire brigade by an employee of the administrative office at 9.13 PM.	Ibid.
	When the fire brigade arrived, all the entrance doors were closed (locked with roll doors).	Ibid.
	A detective reports to the forensic researcher that he visited the phone shop two weeks ago. It was a mess inside the shop.	A police officer reported to a forensic researcher that he thinks the owner of the carpet store is involved in the case. He believes the owner seeks to earn money from the fire insurance because the police officer heard from someone that the carpet store is almost bankrupt.
T= 15	DECISION	DECISION
	A detective found cigarette butts in a half- burned dust bin at the ground floor (located at the entrance of the shop).	Ibid.
	The owner of the shop declares that he left the shop at about 6.45 PM. Just before the owner left the shop, he placed the dust bin inside the shop to prevent vandalism.  Around 7.10 PM, the owner was called by a security agent; the burglar alarm had detected 'some-	Ibid.

	<p>thing’.</p> <p>When the owner arrived, the whole building was already burned.</p>	
	<p>The safety centre journal showed that the alarm was switched on at 6.45 PM. About 7.06 PM, the alarm detected a possible burglar. The owner was called at 7.09 PM.</p>	Ibid.
	<p>A phone shop employee declares that the central heating switch (located in the meter cupboard) sometimes sparked.</p>	Ibid.
T=30	DECISION	DECISION

#### Renkum Murder

	Group A	Group B
T = 0	<p>A man is accused of strangling his wife and children. The bodies were burned in the home to cover the evidence.</p>	Ibid.
T = 15	DECISION	DECISION
	<p>The suspect confesses to the murder of his wife and children. The suspect also confesses to the arson. The confession supports the pathological and forensic evidence. However, some details about the fire starting do not match the fire damage.</p> <p>Laboratory research (with a spectrograph) revealed some traces of titanium and zinc at the crime scene.</p>	<p>The suspect confesses to the murder of his wife and children. The suspect also confesses to the arson. The confession supports the pathological and forensic evidence. However, some details about the fire-raising do not match the fire damage.</p>
	<p>The suspect declares that he started the fire at about 5.40 AM. The suspect called emergency services at 6.29 AM. The suspect confesses to the murder of his wife and children as well as the arson.</p>	No information.

	The fire brigade arrived at the crime scene at 6.41 AM. The fire was extinguished in 3 minutes. The fire fighters reported an odd white smoke while they extinguished the fire.	No information.
	<p>Only a small area (where the bodies of the wife and children were found) in the bedroom was damaged by the fire.</p> <p>A researcher found soot in a V-shape. The V-shape suggests that the fire was extinguished in an early stage of development. This finding is in accordance with the discovery of un-melted plastic furniture. However, the fire damage on the window frame suggests that the fire burned for more than 1 hour.</p>	No information.
T=30	DECISION	DECISION

### Happy Slapping

	Group A	Group B
T = 15		
	Behind a skip located in the 'Red Light District' (Amsterdam, Holland), the police found the murdered body of a 33-year-old ex-criminal. His police record includes drug dealing, robberies and violence.	Behind a skip located in the 'Red Light District' (Amsterdam, Holland), the police found the murdered body of a 16-year-old boy. The boy was on a school trip in Amsterdam but lost his group. His parents and the school informed the police that the boy was missing.
T=30	DECISION	DECISION



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Jelle Groenendaal  
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## About the author

Jelle Groenendaal (1986) studied Policy, Communication and Organization (MSc) at the VU University Amsterdam. In 2007, he started his professional career as a research assistant at the Amsterdam-Amstelland Fire Service. From 2008 to 2014 he worked as a (sr.) researcher and advisor at Crisislab, a research foundation associated with the Radboud University Nijmegen. He was involved in research projects on front-line command, crisis management, societal and organizational resilience, community policing, physical safety policies, cost-benefit analyses of safety measures and risk management. In addition, he developed training exercises and provided operational training to frontline commanders of fire services (OvD/HOvD/COPI), municipalities, waterway authorities and private organizations. He published in the *Journal of Homeland Security and Emergency Management*, *Journal of Forensic Sciences*, *Journal of Contingencies and Crisis Management*, *Police Practice and Research*, *Journal of Leadership Studies*, *Police Journal*, *Natural Hazards Observer*, *International Journal of Leadership Studies*, *Journal of Management and Organization*, *International Journal of Mass Emergencies and Disasters*, *European Journal of Policing Studies*, *FireRescue Magazine*, *Royal Canadian Mounted Police Gazette*, *Natural Hazards Observer*, *Fire-fighting in Canada*, *Management en Organisatie*, *Beleidswetenschappen*, *Tijdschrift voor Veiligheid*, *Cahiers Politiestudies*, *De Brandweerman* and *Managementsite*. He also wrote several book chapters and co-authored the books ‘(Zelf)redzaamheid tijdens de Poldercrash’ (published by Boom Lemma uitgevers), ‘De operationele politiebriefting onderzocht’, ‘Politie in de Netwerksamenleving’ and ‘Tunnelvisie op tunnelvisie’ (all published by Reed Business).



